

SPEC NO. ANZY9800511  
4 September 2003

GENERAL SPECIFICATION  
FOR  
REPAIR ELK RIVER DAM

ARNOLD ENGINEERING DEVELOPING CENTER  
ARNOLD AIR FORCE BASE, TENNESSEE 37389-9998

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**PART 1 GENERAL**

- 1.1 Provide all materials, equipment, and labor repair the Elk River Dam located at Woods Reservoir at Arnold Air Force Base, Tennessee identified on drawing TDT10339. The extent of the work is contained in the drawings and specifications. Major items of work include, but are not limited to, the following:
- A. Provide traffic control devices.
  - B. Provide containment of materials and debris.
  - C. Provide clearing and grubbing.
  - D. Provide subsurface drilling, sampling, and testing.
  - E. Provide piezometers and related instrumentation.
  - F. Demolish existing exterior windows, exterior metal doors and metal frames, roof, existing steel plates and bars over windows and doors as indicated.
  - G. Provide asbestos removal.
  - H. Provide lead removal.
  - I. Repair concrete bridge deck.
  - J. Repair interior and exterior walls at control room.
  - K. Provide exterior windows with glass and security bars as indicated (Option 1).
  - L. Provide exterior windows with laminated polycarbonate glazing as indicated (Option 2).
  - M. Provide exterior metal doors with metal frames as indicated.
  - N. Provide modified built-up roofing and insulation.
  - O. Repair lawns and grasses disturbed by this work.
  - P. Other incidental tasks necessary to complete the work as required by the specifications and drawings.

## 1.2 RECORD (AS-BUILT) DRAWINGS

- A. Mark one full-sized copy of the drawings (red-line) to accurately show as-built conditions during the progress of the job. Show all changes, additions, and deviations from the original drawings. If no changes occur, furnish certification to that effect. Submit to the Contracting Officer for approval prior to applying for final payment.

## 1.3 DEFINITIONS

- A. Certain terms used in the contract documents are defined below. Definitions and explanations contained in this section are not complete, but are general for the work to the extent that they are not stated more explicitly in another element of the contract documents.
  - 1. Furnish. The term "furnish" means to supply and deliver to the project site, ready for unloading, unpacking, assembly, installation, and similar operations.
  - 2. Install. The term "install" describes operations at the project site, including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimensions, finishing, curing, protecting, cleaning, and similar operations.
  - 3. Provide. The term "provide" means "provide complete in place"; that is, "furnish and install."
  - 4. Indicated. Where "as indicated" or words of similar import are used, it shall be understood that the reference is made to the drawings accompanying this contract unless stated otherwise.

## 1.4 CODES AND STANDARDS

- A. AEDC Safety Standard\*:
  - 1. A6 with Supplement User and Subcontractor Safety (Mandatory Documents/Submittals), 1996.
  - 2. B1 Work Clearances, 1998.
  - 3. B2 Safety Locks and Tags, 2002.
  - 4. E18 Managing Wastes Containing Chemical or Petroleum Products, 1998.

\* The Government representative will furnish a copy of this Safety Standard to the contractor upon request.

- B. Air Force Federal Acquisition Regulation (AFFARS):
  - 1. 5352.223-9000 Elimination of Use of Class I Ozone Depleting Substances (ODS), May 1996.
- C. Code of Federal Regulations (CFR):
  - 1. 29 CFR 1926.1101 Asbestos, 1998.
  - 2. 40 CFR 261 Identification and Listing of Hazardous Waste, 2002.

3. 40 CFR 370 EPA Hazardous Chemical Reporting and Community Right to Know Requirement, 2002.

D. Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction (SSRBC), 1995.

1. Website: [www.tdot.state.tn.us/construction/specbook.htm](http://www.tdot.state.tn.us/construction/specbook.htm).

## 1.5 JOB CONDITIONS

- A. Plan and execute this project in a manner to minimize downtime. Furnish new components and devices, complete, with all necessary materials for installation to meet this objective. Schedule all work in advance with the Government representative. The dam is a habitat for the endangered Gray Bat. Perform work in this project only from 1 November through 31 March.
- B. Remove all sanitary waste from lunches off site by contractor furnished containers.
- C. Do not interrupt Elk River Dam operations while performing this work.
- D. Provide containment of all materials and debris demolished and installed for this project to prevent entry into Elk River and Woods Reservoir. Comply with Section 02050.

## 1.6 ASBESTOS PRODUCTS

- A. Do not use products or materials that contain asbestos on this project except as expressly authorized by the Contracting Officer. If no substitutes for asbestos products are available, and the Contracting Officer approves the use of asbestos products, highlight and detail their exact location on the drawings and identify their location in the field following 29 CFR 1926.1101 guidelines.

## 1.7 HAZARDOUS WASTE

- A. Where hazardous waste (as identified in 40 CFR 261) is generated, follow the procedures in AEDC Safety Standard E18, Chemical and Petroleum Products Waste Management, for storing and turning in hazardous waste. These procedures include the requirement to complete Forms GC-565 and GC-1337, which will be furnished by the Government representative.

## 1.8 DISALLOWED PRODUCTS

- A. Do not use products or materials that contain lead, chromium, mercury, cadmium, silver, barium, selenium, beryllium, or arsenic on this project except as expressly authorized by the Contracting Officer. If no substitutes for products containing the listed materials are available, and the

Contracting Officer approves the use of products containing the listed materials, highlight and detail their exact location on the drawings.

#### 1.9 ELIMINATION OF ODS CHEMICALS

- A. The use of Class I ozone depleting substances (ODS) is prohibited. Reference text of AFFARS clause 5352.223-9000 (May 1996).

#### 1.10 SAFETY REQUIREMENTS:

- A. All work shall be accomplished in compliance with AEDC Safety Standards A6 with supplement, B1, and B2.

#### 1.11. SECURITY REQUIREMENTS

- A. Advise prospective bidders that failure to comply with established security rules and procedures while on the property of Arnold Air Force Base could result in disbarment from the base. Applicable security rules are contained in AEDC COI 31-201, Security-Traffic. The work is not being done in a secure, classified area.
- B. Access to the job site is through Government-operated locked gates at each end of Elk River Dam Road. Coordinate with the Government representative for access to and from the site during work for this project.

#### 1.14 HAZARDOUS MATERIAL IDENTIFICATION AND MATERIAL SAFETY DATA

- A. The following procedures shall be followed to meet 40 CFR 370, EPA Hazardous Chemical Reporting and Community Right to Know Requirement.
  - 1. Procedures:
    - a. The contractor shall furnish information on the hazardous materials brought to AEDC property prior to beginning on-site work. Hazardous materials may include solvents, paints, adhesives, acids, or any other substance which could be included within the definitions in paragraph 2.
    - b. The information required is:
      - 1) Company name, point of contact, and phone number.
      - 2) Brief statement indicating how the hazardous material will be used within the scope of the contract.
      - 3) List of all hazardous materials to be used (product name, manufacturer's name, and address).
      - 4) Amount of each material to be stored on site and where it will be stored.
      - 5) Where the product Material Safety Data Sheets (MSDS) will be maintained.
    - c. All unused product is the responsibility of the contractor and shall be removed from AEDC property at the completion of the project.

- d. The contractor shall coordinate with the Government representative and the Hazardous Waste Operations Group (454-3628) if any hazardous waste is to be generated.
- 2. Definitions
  - a. Hazard communication standard. A chemical right-to-know law under OSHA that requires chemical manufacturers and importers to assess the hazards of chemicals they make or import and to distribute this information to inform workers of the hazards associated with these chemicals. This written information is a Material Safety Data Sheet (MSDS).
  - b. Hazard classes. Hazardous materials that have been grouped into classes by the Department of Transportation (DOT). These classes include explosives, flammables, oxidizers and organic peroxides, compress gases, corrosives, and poisons.
  - c. Hazardous material. Any substance that may be harmful when used. Specific substances have been designated as hazardous under the Clean Water Act, the Resource and Conservation and Recovery Act, and the hazardous air pollutants under the Clean Air Act.
  - d. Hazardous waste. Any waste that may cause or significantly contribute to serious illness or death or that may pose a substantial threat to human health or the environment, if not properly managed. Hazardous wastes may be solids, liquids, semi-solids, or compressed gases.

### 1.13 SUBSTITUTION OF TITLES

- A. Substitute "Contracting Officer" for "Engineer" and "Government" for "Department" or "State" whenever those works are used in the Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction (SSRBC), 1995 edition.

END OF SECTION



SECTION 01060  
REGULATORY REQUIREMENTS

PART 1 GENERAL

- 1.1 This section lists regulations, codes, and standards which specify procedural and administrative requirements imposed upon the work.
- 1.2 The contractor shall comply with provisions of the following documents to the extent referenced herein.

A. Government documents:

1. AEDC Safety Standards\*:

- |    |                 |  |
|----|-----------------|--|
| a. | A6 w/Supplement | User and Subcontractor Safety, 1996.                             |
| b. | A9              | Hazard Communications, 1996.                                     |
| c. | B1              | Work Clearances, 2002.   |
| d. | B2              | Safety Locks and Tags, 2002.                                     |
| e. | B5              | Confined Spaces, 2002.   |
| f. | E7              | Asbestos, 1997.  |
| g. | E17             | Oil and Hazardous Substances Spill Response, 2002.               |
| h. | E18             | Managing Waste Containing Chemical and Petroleum Products, 1998. |
| i. | E19             | Lead and Heavy Metals, 1997.                                     |

\* The Government representative will furnish a copy of these Safety Standards to the contractor upon request.

2. Air Force Federal Acquisition Regulations (AFFARS):

- |    |               |   |
|----|---------------|---|
| a. | 5352.223-9000 | Elimination of Use of Class I Ozone Depleting Substances (ODS), May 1996. |
|----|---------------|---|

3. Code of Federal Regulations (CFR):

- |    |                  |  |
|----|------------------|--|
| a. | 29 CFR 1910.134  | Respiratory Protection, 2003.  |
| b. | 29 CFR 1910.1200 | Hazard Communication, 2003.  |
| c. | 29 CFR 1926.55   | Gases, Vapors, Fumes, Dusts, and Mists, 2003.  |
| d. | 29 CFR 1926.57   | Ventilation, 2003.   |
| e. | 29 CFR 1926.59   | Hazard Communication, 2003.  |
| f. | 29 CFR 1926.62   | Lead Standard, 2003.   |
| g. | 29 CFR 1926.1101 | Asbestos, 2003.  |
| h. | 40 CFR 9,        | NPDES – Regulations for Revision of the Water 122, 123, and 124 Pollution Control Program Addressing Storm Water Discharges, 2002. |
| i. | 40 CFR 61        | National Emission Standards for Hazardous Air Pollutants (NESHAP), 2002.   |

- j. 40 CFR 260 Hazardous Waste Management Systems: General, 2002.
- k. 40 CFR 261 Identification and Listing of Hazardous Wastes, 2002.
- l. 40 CFR 370 EPA Hazardous Chemical Reporting and Community Right to Know Requirement, 2002.
- m. 40 CFR 262 Generators of Hazardous Waste, 2002.
- n. 49 CFR 172 Department of Transportation (DOT) Regulations for Use of Hazardous Materials Tables and for Communication, 2003.
- o. 49 CFR 178 DOT Specifications for Packaging, 2003.
- 4. Environmental Protection Agency (EPA) Document:
  - a. SW-846 Evaluating Solid Waste: Physical/Chemical Methods, 1998.
- 5. Public Law (PL):
  - a. 101-637 The Asbestos School Hazard Abatement Reauthorization Act (ASHARA), 1992.
- 6. Tennessee Code Annotated (TCA):
  - a. 69-3-108 Tennessee Water Quality Control Act of 1977.
- 7. Tennessee Department of Environment and Conservation (TDEC):
  - a. Chapter 1200-3-11-02 Hazardous Air Contaminants, Asbestos, 2001.
  - b. Chapter 1200-4-10 National Pollutant Discharge Elimination System General Permits, 2000.
  - c. chapter 0080-6-14 Pest Control Operators, 1999.
- 8. Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction (SSRBC), 1995.
  - a. Website: [www.tdot.state.tn.us/construction/specbook.htm](http://www.tdot.state.tn.us/construction/specbook.htm).
- 9. U. S. Army Corp of Engineers (CoE) Standard:
  - a. EM 1110-2-1906-96 Laboratory Soils Testing.

B. Non-Government documents:

- 1. American Institute of Steel Construction (AISC) Standard:
  - a. 317-84 Manual of Steel Construction, Volume II-Connections.
- 2. American National Standards Institute (ANSI) Standards:
  - a. Z9.2-91 Fundamentals Governing the Design and Operation of Local Exhaust Systems.
  - b. Z88.2-92 Respiratory Protection.
- 3. American Society of Mechanical Engineers (ASME) Standards:
  - a. A13.1-02 Scheme for the Identification of Piping Systems.
- 4. American Society for Testing and Materials (ASTM) Standards:
  - a. A36-03 Carbon Structural Steel.
  - b. A108-99 Steel Bars, Carbon, Cold-Finished, Standard Quality.

d.	A307-02	Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
f.	A501-01	Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
g.	A653-03	Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
h.	B8-99	Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, and Soft.
i.	B370-98	Copper Sheet and Strip for Building Construction.
j.	B633-98	Electrodeposited Coatings of Zinc on Iron and Steel.
k.	C109-02	Method for Compression Strength of Hydraulic Cement Mortars.
l.	C117-95	Material Finer than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.
m.	C128-01	Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
n.	C150-02	Portland Cement.
o.	C165-00	Measuring Compressive Properties of Thermal Insulations.
p.	C208-01	Cellulosic Fiber Insulating Board.
q.	C348-02	Flexural Strength of Hydraulic Cement Mortars.
r.	C404-97	Aggregates for Masonry Grout.
s.	C496-96	Splitting Tensile Strength of Cylindrical Concrete Specimens.
t.	C518-02	Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
v.	C728-97	Perlite Thermal Insulation Board.
w.	C827-01	Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.
x.	C882-99	Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.
y.	C920-02	Elastomeric Joint Sealants.
z.	C1036-01	Flat Glass.
aa.	C1289-02	Faced Rigid Cellular Polyisocyanurate Thermal Insulated Board.
bb.	C1349-96	Architectural Flat Glass Clad Polycarbonate.
cc.	D16-00	Standard Terminology for Paint, Related Coatings, Materials, and Applications.
dd.	D36-00	Softening Point of Bitumen.
ee.	D41-00	Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
ff.	D312-00	Asphalt Used in Roofing.

jj.	C422-02	Particle-Size Analysis of Soils.
mm.	D1452-00	Soil Investigation and Sampling by Auger Borings.
nn.	D1586-99	Penetration Test and Split-Barrel Sampling for Soils.
oo.	D1621-00	Compressive Properties of Rigid Cellular Plastics.
pp.	D1622-98	Apparent Density of Rigid Cellular Plastics.
qq.	D1668-97	Glass Fabrics (Woven and Treated) for Roofing and Waterproofing.
rr.	D1785-99	Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
ss.	D1863-02	Mineral Aggregate Used on Built-Up Roofs.
tt.	D2000-01	Rubber Products in Automotive Applications.
uu.	D2178-97	Asphalt Glass Felt Used in Roofing and Waterproofing.
ww.	D2487-00	Classification of Soils for Engineering Purposes (Unified Soil Classification System).
xx.	D2488-00	Description and Identification of Soils (Visual-Manual Procedure).
yy.	D2626-97	Asphalt-Saturated and Coated Organic Felt Base Sheet Used in Roofing.
zz.	D2822-97	Asphalt Roof Cement
aaa.	D2824-02	Aluminum-Pigmented Asphalt Roof Coatings, Non-Fibered, Asbestos Fibered, and Fibered Without Asbestos.
bbb.	D2850-03	Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils.
ccc.	D4073-98	Tensile-Tear Strength of Bituminous Roofing Membranes.
ddd.	D4318-00	Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
eee.	D4479-00	Asphalt Roof Coatings-Asbestos Free.
fff.	D5147-02	Sampling and Testing Modified Bituminous Sheet Material.
ggg.	E84-03	Surface Burning Characteristics of Building Materials.
hhh.	E283-99	Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specific Pressure Differences Across the Specimen.
iii.	E329-02	Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
jjj.	E330-02	Structural Performance of Exterior Windows, Skylight, Doors and Curtain Walls by Uniform Static Air Pressure Difference.

- kkk. E331-00 Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- III. E413-94 Classification for Rating Sound Insulation.
- mmm. F512-01 Smooth Wall Poly Vinyl Chloride (PVC) Conduit and Fitting for Underground Installation.
- 5. American Wood-Preservers' Association (AWPA) Standards:
  - a. C20-99 Structural Lumber-Fire Retardant Treatment by Pressure Treatment.
- 6. American Welding Society (AWS), Inc., Standards:
  - a. D1.1-02 Structural Welding Code - Steel.
  - b. Z49.1-99 Safety in Welding, Cutting and Allied Processes.
- 7. Builders Hardware Manufacturers Association Inc. (BHMA) Standards:
  - a. A156.1-00 Butts and Hinges.
  - b. A156.2-96 Bored and Preassembled Locks and Latches.
  - c. A156.3-01 Exit Devices.
  - d. A156.4-00 Door Controls – Closers.
  - e. A156.5-01 Auxiliary Locks and Associated Products.
  - f. A156.6-01 Architectural Door Trim.
  - g. A156.8-00 Door Controls – Overhead Stops and Holders.
  - h. A156.15-01 Release Devices Closer Holder-Electromagnetic and Electromechanical.
  - i. A156.16-02 Auxiliary Hardware.
  - j. A156.18-00 Materials and Finishes.
- 8. Factory Mutual Engineering and Research Corporation (FMERC) Standards.
  - a. I-28-96 Insulated Steel Decks.
  - b. I-52-86 Field Uplift Tests.
  - c. 4470-96 Class 1 Roof Covers.
- 9. Glass Association of North America (FGMA) Standard:
  - a. Glazing Manual, 1990.
- 10. Hollow Metal Manufacturers Association (HMMA) Standards:
  - a. 802-92 Manufacturing of Hollow Metal Doors and Frames.
  - c. 810-87 Hollow Metal Doors
  - d. 820-87 Hollow Metal Frames.
  - e. 830-87 Hardware Preparation and Locations for Hollow Metal Doors and Frames
  - f. 840-99 Installation and Storage of Hollow Metal Doors and Frames
  - g. 850-00 Fire Rated Hollow Metal Doors & Frames
  - h. 863-98 Detention Security Hollow Metal Doors and Frames.
  - i. 890-00 Technical Summary of Hollow Metal by HMMA
- 11. National Fire Protection Association (NFPA) Standards:

- a. 70-02 National Electrical Code (NEC).
- b. 80-99 Fire Doors and Fire Windows.
- c. 241-00 Safeguarding Construction, Alternation, and Demolition Operations.
- d. 252-03 Fire Test of Door Assemblies.
- 12. Southern Pine Inspection Bureau (SPIB) Standard:
  - a. Grading Rules, 2003.
- 13. Steel Structures Painting Council (SSPC) Standard:
  - a. Guide 7-95 Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.
- 14. Underwriters Laboratories, Inc. (UL) Standards:
  - a. Building Materials Directory, 2003.
  - b. 1-03 Flexible Metal Conduit.
  - c. 6-03 Electrical Rigid Metal Conduit.
  - d. 305-01 Panic Hardware.
  - e. 360-03 Liquid-Tight Flexible Steel Conduit.
  - f. 514B-02 Fittings for Cable and Conduit.
  - g. 586-00 Safety High-Efficiency, Particulate, Air Filter Units.
  - h. 797-00 Electrical Metallic Tubing.
- C. Drawings: TDT10339 Repair Elk River Dam.  
8 sheets

END OF SECTION

SECTION 01340  
SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES

**PART 1 GENERAL**

- 1.1 DESCRIPTION OF REQUIREMENTS. This section specifies procedural requirements for non-administrative submittals, including shop drawings, product data, samples, and other miscellaneous work-related submittals. These submittals are required to amplify, expand, and coordinate other information contained in the contract. Non-work-related submittals are addressed elsewhere in the contract rather than in the specification and may include items such as: contract progress schedule, permits, payment applications, performance and payment bonds, insurance certificates, and progress reports.
- A. Shop drawings. These are technical drawings and data specially prepared for this project including fabrication and installation drawings, setting and seaming diagrams, and coordination drawings (for use on-site).
  - B. Product data. This data includes standard printed information on manufactured products that has not been specially prepared for this project, including manufacturers' product specifications and installation instructions, standard color charts, catalog cuts, standard wiring diagrams, and standard product operating and maintenance manuals.
  - C. Samples. These are physical examples of work, including swatches showing color, texture, and pattern; color-range sets; and units of work to be used for independent inspection and testing.
  - D. Miscellaneous submittals. These are work-related, non-administrative submittals that do not fit in the three previous categories, including the following:
    - 1. Maintenance agreements.
    - 2. Survey data and reports.
    - 3. Project photographs.
    - 4. Record drawings (as-built drawings).
    - 5. Field measurement data.
    - 6. Operating and maintenance manuals.
    - 7. Keys and other security protection devices.
    - 8. Maintenance tools and spare parts.
    - 9. Overrun or maintenance stock.
    - 10. Qualification certificates.

## 1.2 SUBMITTAL PROCEDURES

- A. Coordination. Coordinate the preparation and processing of submittals with the performance of the work. Coordinate each submittal with other submittals and related activities, such as testing, purchasing, fabricating, and delivering, that require sequential activity.
- B. Listing. At the end of this section is a summarized listing of the submittals required for the work. The listing is included for the convenience of users of the contract documents.
- C. Transmittal timing. Prepare and transmit each submittal to the Contracting Officer sufficiently in advance of the scheduled performance of related work and other applicable activities. Transmit different kinds of submittals for the same unit of work so that processing will not be delayed by the Government's need to review submittals concurrently for coordination.
- D. Review time. Allow sufficient time so that contract performance will not be delayed as a result of the time required to properly process submittals, including time for re-submittals, if necessary. Allow 10 working days for initial Government processing of each submittal. No extension of time will be authorized because of the contractor's failure to transmit submittals to the Government sufficiently in advance of the work.
- E. "Approval" submittals. Submittals requiring approval by the Contracting Officer are so designated in the applicable sections and the submittal list at the end of this section. When brand names or equal are specified, any "equal" submitted will require approval. Any submittal requesting a deviation will require approval. Do not install any equipment or material requiring approval submittals until approvals are received from the Contracting Officer. The Government will status receipt or approval of all submittal requirements in the last two columns.
- F. "Information only" submittals. Submittals not requiring the Contracting Officer's approval are considered to be "information only" submittals.

## 1.3 SPECIFIC SUBMITTAL REQUIREMENTS. Submittal requirements for individual units of work are specified in the applicable specification section. Except as otherwise indicated in the individual sections, comply with the following requirements for each type of submittal.

- A. Shop drawings. Information required on shop drawings includes dimensions, identification of specific products and materials which are included in the work, compliance with specified standards, and notations of coordination requirements with other work. Provide special notations of dimensions that have been established by field measurements. Highlight, encircle, or otherwise indicate



deviations from the contract documents on the shop drawings. Furnish one reproducible and four copies.

- B. Product data. General information required specifically as product data includes manufacturers' standard printed recommendations for application and use, compliance with recognized standards of trade associations and testing agencies, the application of their labels and seals (if any), special notation of dimensions which have been verified by way of field measurement, and special coordination requirements for interfacing the material, product, or system with other work. Furnish four copies.
- C. Samples. Submit samples for the Contracting Officer's visual review of general kind, color, pattern, and texture for a final check of the coordination of these characteristics with other related elements of the work and for quality control comparison of these characteristics between the final sample submittal and the actual work as it is delivered and installed.
- D. Miscellaneous submittals. These submittals include the following:
  - 1. Inspection and test reports. Furnish three copies of such reports.
  - 2. Record drawings.
  - 3. Operating and maintenance data. Furnish three bound copies of operating data and maintenance manuals.
  - 4. Materials and tools. Refer to individual sections of the specification for required quantities of spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.
  - 5. Certifications, reports, instructions, and lists. Furnish three copies of such submittals.

#### 1.4 REQUIRED SUBMITTALS

No.	Section Reference	Submittal Description	App	Info
1	01010 para 1.2A	Record Drawings	X	
2	02020 para 1.3A	Manufacturer's Product Data and Certification	X	
3	02020 para 1.3B	Logs of Borings	X	
4	02020 para 1.3C	Certified Soil Analysis Reports	X	
5	02020 para 1.3D	Piezometer Locations & Elevation Data Sheet As-Build Drawings	X	
6	02020 para 1.3E	Falling Head Test Report	X	
7	02050 para 1.2A	Proposed Demolition Methods and Operations	X	
8	02050 para 1.2B	Demolition and Installation Containment Plan	X	
9	02080 para 1.3A	Employee Certification	X	

Table I. Required submittal list - Continued

No.	Section Reference	Submittal Description	App	Info
10	02080 para 1.3B	Training and Medical Certifications		X
11	02080 para 1.3C	Training and Hazard Communications Certification	X	
12	02080 para 1.3D	Product List	X	
13	02080 para 1.3E	Equipment List	X	
14	02080 para 1.3F	Notice of Violation		X
15	02080 para 1.3G	Environmental, Health, and Safety Plan	X	
16	02080 para 1.3H	Asbestos Removal Plan	X	
17	02080 para 1.3I	Air Sampling Reports		X
18	02080 para 1.3J	Testing Certifications	X	
19	02080 para 1.3K	CPR Certification		X
20	02080 para 1.3L	Insurance Coverage Certification	X	
21	02080 para 1.3M	Sampling List	X	
22	02080 para 1.3N	Operator's Log and Shipper's Log	X	
23	02080 para 1.3O	Daily Logs: Sign-In and Field Notes		X
24	02085 para 1.4A	Employee Certification	X	
25	02085 para 1.4B	Training and Medical Certification		X
26	02085 para 1.4C	Notice of Violation		X
27	02085 para 1.4D	Environmental, Health, and Safety Plan	X	
28	02085 para 1.4E	Training and Hazard Communications Certification	X	
29	02085 para 1.4F	Product List	X	
30	02085 para 1.4G	Lead Abatement Plan	X	
31	02085 para 1.4H	Air and Substrate Sampling Report		X
32	02085 para 1.4I	Laboratory Testing Certifications		X
33	02085 para 1.4J	Air Monitoring Results		X
34	02085 para 1.4K	Equipment List		X
35	02085 para 1.4L	Rental Equipment List		X
36	02085 para 1.4M	Shower Water Test Results		X
37	02110 para 1.3A	Site-Clearing Plan	X	
38	02110 para 1.3B	Storm Water Pollution Prevention/Erosion Control Plan	X	
39	02110 para 1.3C	NPDES Storm Water Construction Notice to Intent	X	
40	02110 para 1.3D	NPDES Storm Water Construction Notice of Termination	X	
41	02110 para 1.3E	Payment of Storm Water Construction Fee Receipt	X	
42	02110 para 1.3F	Pest Control Certification	X	
43	02575 para 1.4A	Grout Product Data	X	

Table I. Required submittal list - Continued

No.	Section Reference	Submittal Description	App	Info
44	02575 para 1.4B	Polymer Modified Concrete Mix Design	X	
45	02575 para 1.4C	Polymer Modified Concrete Test Reports	X	
46	02575 para 1.4D	Backer Rod and Sealant Product Data	X	
47	02575 para 1.4E	Polymer Modified Concrete Product Data	X	
48	02575 para 1.4F	Thermoplastic Pavement Marking Product Data	X	
49	03600 para 1.3A	Material Product Data and Certification	X	
50	03732 para 1.3A	Product Data	X	
51	03732 para 1.3B	Manufacturer's Certificate	X	
52	05050 para 1.3A	Welding Certification	X	
53	07550 para 1.3A	Manufacturer's Materials Certification	X	
54	07550 para 1.3B	Roof Deck Assembly Test Reports	X	
55	07550 para 1.3C	Insulation Product Data	X	
56	07550 para 1.3D	Manufacturer's 20-Year Warranty	X	
57	07550 para 1.3E	Manufacturer's Inspection Statement and 20-Year Installation Warranty	X	
58	07550 para 1.3F	Retrofit Roof Drain Manufacturer's Product Data	X	
59				
60	07600 para 1.3A	Sheet Metal Materials Certification	X	
61	07600 para 1.3B	Shop Drawings	X	
62	07600 para 1.3C	Sealant Product Data and Samples	X	
63	07900 para 1.2A	Product Data and Samples	X	
64	07900 para 1.2B	Manufacturer's Surface Preparation and Installation Instructions		X
65	08111 para 1.4A	Shop Drawings	X	
66	08111 para 1.4B	Product Data	X	
67	08111 para 1.4C	Door Material Manufacturer's Certification	X	
68	08112 para 1.4A	Shop Drawings	X	
69	08112 para 1.4B	Product Data	X	
70	08112 para 1.4C	Frame Material Manufacturer's Certification	X	
71	08512 para 1.4A	Samples	X	
72	08512 para 1.4B	Shop Drawings and Manufacturer's Literature	X	
73	08710 para 1.4A	Product Data	X	
74	08710 para 1.4B	Parts List and Templates		X
75	08710 para 1.4C	Samples	X	
76	08710 para 1.4D	Manufacturer's Installation Instructions		X
77	08710 para 1.4E	Project Record Documents	X	
78	08710 para 1.4F	Operation and Maintenance Data		X
79	08710 para 1.4G	Keys		X
80	08800 para 1.3A	Manufacturer's Product Data and Installation Instructions	X	

Table I. Required submittal list - Continued

No.	Section Reference	Submittal Description	App	Info
81	09900 para 1.4A	Product Data	X	
82	09900 para 1.4B	Samples	X	
83	13429 para 1.3A	Piezometers with Cable Lengths	X	
84	13429 para 1.3B	Product Data	X	
85	13429 para 1.3C	As-Built Drawings	X	
86	13429 para 1.3D	Operation and Maintenance Manuals		X
87	13429 para 1.3E	Piezometer Operation Checkout Report	X	

Table I. Required submittal list - Completed.

END OF SECTION

**PART 1 GENERAL****1.1 SUMMARY**

- A. Perform subsurface drilling, sampling, and testing and follow with installation of piezometers. Perform field engineering. Perform “falling head” test on each piezometer.

**1.2 CODES AND STANDARDS**

- A. American Society for Testing and Materials (ASTM) Standards:
  - 1. C117-95 Material Finer than 75-Micrometers (No. 200) Sieve in Mineral Aggregates by Washing.
  - 2. C128-01 Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregate.
  - 3. C150-02 Portland Cement.
  - 4. C422-02 Particle-Size Analysis of Soils.
  - 5. D1452-00 Soil Investigation and Sampling by Auger Borings.
  - 6. D1586-99 Penetration Test and Split-Barrel Sampling for Soils.
  - 7. D1785-99 Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, and 120.
  - 8. D2487-00 Classification of Soils for Engineering Purposes (Unified Soil Classification System).
  - 9. D2488-00 Description and Identification of Soils (Visual-Manual Procedure).
  - 10. D2850-03 Unconsolidated-Undrained Triaxial Compression Test on Cohesive Soils.
  - 11. D4318-00 Liquid Limit, Plastic Limit, and Plasticity Index of Soils.
  - 12. E329-02 Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
- B. U. S. Army Corp of Engineers (CoE) Standard:
  - 1. EM 1110-2-1906-96 Laboratory Soils Testing.

**1.3 SUBMITTALS**

- A. Manufacturer's data and certification for the products listed in this section.
- B. Logs of borings.
- C. Certified testing laboratory reports on soil analysis.

- D. As-Built drawing of exact piezometer locations and elevation data sheet for each piezometer (see Appendix).
- E. Report of “falling head” test for each piezometer.

## **PART 2 PRODUCTS**

- 2.1 FINE AGGREGATE: Washed sand with less than 10 percent passing No. 30 sieve. The content of silt, loam, clay, and the like, determined as prescribed in ASTM C117, shall not exceed three percent by weight. The bulk saturated surface dry specific gravity, as prescribed in ASTM C128, shall be not less than 2.58. The sand shall be graded such that particles are larger than the width of the piezometer screen openings.
- 2.2 BENTONITE: Pellet form for drilling application, “P1-Pellets”, or equal.
- 2.3 DRILLING FLUID: Johnson “Revert”, or equal.
- 2.4 PIPING: Schedule 40 PVC in accordance with ASTM D1785, Class 150.
- 2.5 PIEZOMETER SCREENS: Schedule 40 PVC well-point tips with horizontal slots not exceeding 0.020 inch in width.
- 2.6 PIEZOMETER COVER: Galvanized steel as shown on the drawings.
- 2.7 CONCRETE: ASTM C150, Type I, Class A, 3000 psi.
- 2.8 PAINT: Industrial enamel, Sherwin-Williams Series B54, or equal.

## **PART 3 EXECUTION**

- 3.1 Drill shafts for piezometers at locations shown on the drawings in accordance with ASTM D1452 and ASTM D1586. Exact locations shall be determined in the field by the Government representative.
- 3.2 Perform drilling and sampling at each location by driving a six-inch diameter continuous split-spoon sampler 18 inches in the soil followed by reaming with the auger. Repeat the process until the specified depth has been drilled in the reservoir embankments locations to the depth indicated. Apply “Revert”, or equal, drilling fluid as required during drilling operation. Provide soil sample classifications and descriptions in accordance with ASTM D2487 and ASTM D2488.
- 3.3 Send soil samples to the ASTM E329 certified testing laboratory for testing. Testing shall be in accordance with CoE 1110-2-1906. Provide the following test:
  - A. Percent natural moisture at 3-foot intervals for each hole.

- B. Atterberg limits in accordance with ASTM D4318, one test per hole, with verified soil classification.
- C. Grain size analysis in accordance with ASTM D422, one per hole.
- D. Unconsolidated undrained triaxial test in accordance with ASTM D2850, 3 tests.

3.4 Install the piezometer immediately following completion of hole drilling as follows:

- A. Fill the base of the shaft with sand to the depth shown on the drawings.
- B. Install the piezometer screen and piping. Provide proper alignment such that a dummy having an outside diameter 1/2-inch less than the casing shall move freely up and down the total length of the shaft.
- C. Install sand around the screen to the depth shown on the drawings.
- D. Install bentonite pellets and pack to the depth shown on the drawings.
- E. Backfill over bentonite with excavated material or lean concrete.
- F. Install the cover and pad. Paint box bronze.

3.5 Record exact locations (Tennessee Plane Coordinates) and elevations of piezometers.

3.6 After completion of the piezometers installation, flush each piezometer with water and perform a "falling head" test on each piezometer, in the presence of the Government representative, in the following manner:

- A. Fill the piezometer to the rim with water.
- B. Record a reading of the water level at intervals of 1, 5, 10, and 30 minutes after filling.
- C. Record a reading of the water level every 30 minutes for each additional hour for a total of eight hours.

END OF SECTION

**SECTION 02050  
DEMOLITION****PART 1 GENERAL**

- 1.1 SUMMARY. Demolish existing concrete, pavement, windows, doors, and roofing materials and related flashings. The extent of demolition work is shown on the drawings. Demolition includes the complete removal and disposal of demolished materials, as shown on the drawings and specified herein. Coordinate demolition of non-asbestos materials with demolition of asbestos materials as specified in Sections 02080 to provide concurrent demolition operations.
- 1.2 CONTAINMENT: Provide containment of all materials and debris demolished and installed for this project to prevent entry into the Elk River Dam and Woods Reservoir. Provide containment devices such as safety nets, pans, and similar devices for 100 percent retrieval of fallen objects. Provide a containment plan including methods, materials, and equipment.
- 1.3 SUBMITTALS
  - A. Proposed methods and operations of demolition for review prior to the start of work. Include in the schedule the coordination for continuation of building service as required. Identify the approach to each building that will be used for removal of demolished materials and new materials to be used.
  - B. Containment plan for demolition and installation.

**PART 2 PRODUCTS - None****PART 3 EXECUTION**

- 3.1 Conduct demolition operations and the removal of debris to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
- 3.2 Do not interrupt Elk River Dam operations while performing this work.
- 3.3 Do not close or obstruct streets, walks, or other occupied or used facilities without concurrence from the Government representative. Provide alternative routes around closed or obstructed traffic ways.
- 3.4 Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent personal injury and damage to adjacent buildings or other facilities.
- 3.5 Repair damages caused to adjacent facilities by demolition operations.



- 3.6 Maintain existing utilities that are to remain, keep them in service, and protect against damage during demolition operations. Do not interrupt existing utilities serving occupied or used facilities except with the concurrence of the Government representative. Verify that existing roof drains and connecting piping are functioning without leaks before start of construction and after completion of construction. Clean and repair roof drains, piping, and connections damaged by construction operations.
- 3.7 Minimize the amount of dust and dirt rising and scattering in the air. Provide two 15-pound fire extinguishers, using ammonium phosphate firefighting agent, at all levels where demolition operations are being conducted.
- 3.8 Clean adjacent structures and improvements of dust, dirt, and debris caused by demolition operations. Return adjacent areas to the condition existing prior to the start of the work.
- 3.9 Demolish existing construction where shown on the drawings, and remove from the site. Provide protective coverings as required to prevent damage to existing buildings, grounds, and equipment. Provide containment as required to prevent debris from entering reservoir and river. Do not remove more existing roof material than can be replaced with new material in the same day. Remove debris, rubbish, and other materials resulting from demolition from the site each day and transport to the AEDC construction landfill. Do not place asbestos or lead in the AEDC construction landfill. See Section 02080 for instructions on handling asbestos materials.
- 3.10 Dispose of lead materials using the drum storage method specified in Section 02085.

END OF SECTION

SECTION 02080  
ASBESTOS REMOVAL**PART 1 GENERAL**

## 1.1 SECTION INCLUDES

- A. Removal and disposal of asbestos materials.

## 1.2 CODES AND STANDARDS

A. AEDC Safety Standards:

1. A9 Hazard Communications, 1996.
2. B5 Confined Spaces, 2002.
3. E7 Asbestos, 1997.
4. E18 Chemical and Petroleum Products Waste Management, 1998.

B. American National Standards Institute (ANSI) Standards:

1. Z9.2-01 Fundamentals Governing the Design and Operation of Local Exhaust Systems.
2. Z88.2-92 Respiratory Protection.

C. American Society of Mechanical Engineers (ASME) Standard:

1. A13.1-02 Scheme for the Identification of Piping Systems.

D. Code of Federal Regulations (CFR):

1. 29 CFR 1910.134 Respiratory Protection, 2003.
2. 29 CFR 1910.1200 Hazard Communication, 2003.
3. 29 CFR 1926.55 Gases, Vapors, Fumes, Dusts, and Mists, 2003.
4. 29 CFR 1926.59 Hazard Communication, 2003.
5. 29 CFR 1926.1101 Asbestos, 2003.
6. 40 CFR 61 National Emission Standards for Hazardous Air Pollutants (NESHAP), 2002.
7. 40 CFR 260 Hazardous Waste Management Systems: General, 2002.
8. 40 CFR 261 Identification and Listing of Hazardous Wastes, 2002.

E. Public Law (PL):

1. 101-637 The Asbestos School Hazard Abatement Reauthorization Act (ASHARA), 1992.

F. Tennessee Department of Environment and Conservation Standard:

1. Chapter 1200-3-11-02 Hazardous Air Contaminants, 2001.

### 1.3 SUBMITTALS

- A. Evidence satisfactory to the Contracting Officer that the firm removing asbestos has at least one designated employee on site during all abatement activity who has received certification by completing an Asbestos Abatement Contractor Training Course approved or sponsored by the U. S Environmental Protection Agency (EPA) and who will be responsible for the work whenever any phase of the project is in progress. The course shall be a 5-day supervisory course. A 1-day supervisory refresher course also is acceptable if documents showing completion of the initial 5-day course are submitted and the refresher course or courses have been completed within the required time frame to maintain currency in EPA certifications. This training shall have been completed within 12 months prior to the bid opening date. Certification shall remain current throughout the course of the job and shall comply with 40 CFR 61 and PL 101-637.
- B. Written certification that all employees involved in the asbestos removal have received training and medical examinations as required by 29 CFR 1926.1101 and 29 CFR 1910.134, respectively. Certification includes respirator fit test records and a copy of respirator operating procedures and program, as specified in 29 CFR 1910.134. Include with the certifications dates of the most recent training, medical examinations, and a physician's statement indicating that workers are physically able to perform asbestos work and use the required respiratory and general body protection. Provide this information for all personnel including management and any air monitoring personnel on the job site before their first entry onto the job site. Keep information current during all phases of the job.
- C. A copy of the hazard communications program and certification that all employees have been trained concerning the hazard communications standards and the written program in accordance with 29 CFR 1910.1200 and/or 29 CFR 1926.59.
- D. A list of products to be used and a Material Safety Data Sheet (MSDS) for each. Products include, but are not limited to, aerosol sprays of any kind, wetting and cleaning agents, fuels, solvents, and paints. MSDS's will be kept in a notebook and will be indexed for easy reference. This MSDS notebook shall remain available to all employees on the job site at all times.
- E. A list of all equipment to be used and manufacturers' literature showing that the equipment and materials meet all EPA, Occupational Safety and Health Administration (OSHA), and ANSI standards for use in asbestos abatement activities. Do not use materials that are or will create hazardous waste as described in 40 CFR 261.

- F. Any citation or notice of violation from any Government agency issued as a result of work performed under this contract or any contract conducted in the last three years. If none have been received, submit a letter certifying that none have been received.
- G. Environmental, health, and safety plan that addresses all environmental, health, and safety aspects of the job. Submit this plan within 30 calendar days after award of the contract and before any field work begins. Include methods to ensure safety including a lockout/tagout plan; job safety analysis; tool box safety meeting minutes; accident reports and investigations; lead-testing data/certification; fall protection systems; shop drawings; procedures for disposing of waste, scrap, and excess materials; and procedures for work involving transportation or disposal of hazardous waste. The plan shall address all other environmental, health, and safety concerns associated with the job, including a hazardous waste management plan in accordance with 40 CFR 260, a fire safety plan, and procedures for addressing other emergencies within the work area and in compliance with 29 CFR 1926.55.
- H. Asbestos removal plan including the precautions to be taken in this work. Do not proceed without the Contracting Officer's written approval of the plan. The plan shall include location of control areas and change rooms; layout of change rooms; location of hot and cold running water shower facilities; types of air machines used; kinds of interface of trades involved in the construction; schedule for sequencing of asbestos-related work; plan for asbestos disposal; type, manufacturer, and name of wetting agent and asbestos sealer to be used; air monitoring; and a detailed description of the pollution control method to be used. The plan shall also state the method proposed to handle oversized asbestos material (too large for bagging). Include dates of proposed work commencement and completion (by phases, if more than one phase is required or proposed).
- I. Air sampling reports are to include the results of daily area and personal air and excursion limit sampling along with negative pressure differential documentation.
- J. Testing certifications.
  - 1. Evidence that all air sampling is analyzed by a laboratory in full compliance with the OSHA Reference Method and which participates in an inter-laboratory quality assurance program or is accredited by the American Industrial Hygiene Association.
  - 2. Evidence that all persons analyzing samples have successfully completed the required National Institute for Occupational Safety and Health (NIOSH) and EPA-approved courses and been certified proficient by successfully participating in a NIOSH Proficiency Analytical Testing (PAT) (air) or National Institute of Standards and Technology (NIST) program within the last year.

3. Should the contractor choose to collect and analyze bulk samples, submit evidence that the laboratory analyzing asbestos bulk samples is a NIST-accredited laboratory. (Bulk samples may be collected only with the permission of the Contracting Officer and shall be returned to AEDC for disposal.)
- K. Certification that persons monitoring work in confined spaces have successfully completed a course in cardiopulmonary resuscitation (CPR) by the American Red Cross or the American Heart Association.
- L. Evidence that the firm removing asbestos has suitable insurance to cover any asbestos liabilities.
- M. A list of the sampling numbers required by paragraph 3.1B.
- N. AEDC asbestos landfill Operator's Log and Shipper's Log (Form GC-1622). This form will be provided by the Government representative.
- O. Daily logs.
  1. Sign-in logs will be submitted at least monthly and when the job is completed. Sign-in logs will include the following information for all persons entering the controlled area:
    - a. First and last name (must be legible).
    - b. Company and organization.
    - c. Social security number.
    - d. Date and time of arrival and departure.
    - e. Reason of visit.
  2. Field notes will also be submitted at least monthly and when the job is completed.

#### 1.4 QUALITY ASSURANCE

- A. Demolish, remove, and dispose of asbestos materials as indicated on the drawings and specified herein. For the purposes of this specification, full-gross removal containment is required for any removal activity that takes two people over four hours to complete or that is required in 29 CFR 1926.1101. During removal, workers shall not leave the enclosure except for life-threatening emergencies. This applies only to removal activity and not to enclosure construction or final area clean-up.
- B. Use glove bag techniques as described in 29 CFR 1926.1101 and paragraph 3.7C, for small sections. If samples taken during initial glove bag work exceed 0.01 fiber per cubic centimeter (f/cc), stop the job and remove all remaining asbestos using full-gross removal containment. Gross removal methods utilizing full decontamination units as described in 29 CFR 1926.1101, Appendix F, shall be the method of removal.

- C. On small sections of pipe, valves, or other small areas of abatement where the glove bag is not suitable and full-gross removal containment is not required, mini-enclosures as specified in 29 CFR 1926.1101 may be used. Mini-enclosures shall be equipped with high-efficiency particulate air (HEPA) filtered exhaust ventilation.
- D. Assume unidentified insulating material to be asbestos.

## **PART 2 PRODUCTS**

### **2.1 AIR RETURN FILTERS**

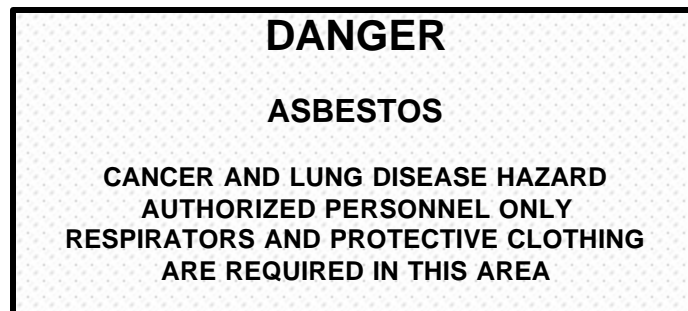
- A. 1-inch-thick disposable random fiber.

### **2.2 ENCAPSULANTS**

- A. Dryable to clear appearance and paintable with standard latex paints (American Coatings Corporation Cable Coating 22P Penetrating Sealant and Lock Down, or approved equal).

## **PART 3 EXECUTION**

- 3.1 **CONTROL OF WORK:** Control work locations where the generation of asbestos dust could expose persons not properly protected.
  - A. Use safety ropes and barricades and post with 20-inch by 14-inch signs bearing the following warning:



- B. Record all sampling numbers identified on asbestos material to be removed.
- C. Ensure isolation of the work area or construction of the enclosure complies with 29 CFR 1926.1101. In addition, a continuous layer of true 6-mil polyethylene or other impermeable material shall first be applied to the floor and extend 12 inches up the wall. Use a layer of true 4-mil polyethylene for the first wall and ceiling and extend 12 inches onto the floor. Place the second layer of true 6-mil polyethylene on the floor and extend 18 inches up the wall

and follow by the second layer of true 4-mil polyethylene on the walls and ceiling and extend 18 inches onto the floor. Polyethylene used for floors and walls shall be installed in such a manner to prevent ballooning of the polyethylene from the walls or floors. Drop and splatter sheets shall also be used in all containments in addition to the use of the two layers of polyethylene on the walls and the three layers on the floors of the containment. In special situations, such as enclosures constructed outside, you may elect to construct the entire containment out of true 6-mil polyethylene or other impermeable material also supported by plywood or other rigid material. Coordinate such construction with the Government representative. Enclosures constructed to contain asbestos work such as around equipment, utility systems, windows, doors, or other industrial systems shall be constructed of lumber (such as two by fours) or other rigid material supported on centers no greater than 48 inches apart and in a manner that shall maintain the integrity of the containment and prevent containment failure and release of asbestos fibers outside the work area. The use of wire, cable and other non-rigid systems shall not be used as containment framework or to otherwise hold polyethylene unless also supported by lumber or other rigid material on no greater than 48-inch centers. Support of polyethylene by wire, cable or other non-rigid materials by themselves shall not be allowed. Polyethylene sheeting shall be attached to the lumber or other rigid material and held in place through the use of spray glue, wooden screen molding nailed or screwed in place, duct tape and/or other mechanical methods.

- D. Construct hygiene facilities for decontamination of workers and equipment in the same way except use true 6-mil polyethylene for walls, ceiling, and floor. Hygiene facilities for decontamination of workers and equipment must be contiguous with the work area in all instances. Construct doors so that flaps completely isolate the rooms in the event of air exhaust ventilation failure and allow easy access for personnel and equipment. The clean room shall be large enough to accommodate at least three workers. Prevent direct viewing into the shower, clean room, or dirty room by other personnel by constructing the walls and ceilings of these areas of black polyethylene.
- E. All negative pressure enclosures shall be smoke tested after initial setup and at the beginning of each work shift.
- F. Ensure that the enclosure walls, floor, and ceiling do not billow or pull out more than 6 inches from the walls or floors to allow for effective cleaning and easy movement of personnel and equipment while inside.
- G. Repair damaged barriers and correct defects as soon as they are discovered. Visually inspect containment barriers at the beginning of each work period. The Government representative may use smoke tube methods to test barrier effectiveness.

- H. Do not commence work until signs are posted, required isolation barriers are erected, and the Contracting Officer or the Government representative has authorized the work to begin. In addition, all equipment such as ladders, scaffolds, HEPA vacuums, air machines, trucks, and other tools and equipment are subject to visual inspection and bulk sampling to ensure that no asbestos debris or contamination is brought onto AEDC from the contractor's previous jobs. Wrap in two layers of true 6-mil polyethylene sheeting or properly bag any items that have visible debris, label ASBESTOS, and remove from AEDC. Encapsulation of items is not sufficient justification to use contaminated equipment. Items that do not pass visual inspection shall not be cleaned at AEDC.
- I. Turn off all building ventilation air systems during preparation and until the area has passed final visual inspection and final air sampling by the Government representative. Remove all heating, ventilation, and air conditioning system filters before commencing asbestos removal and treat them as asbestos contaminated. Seal all air supply and return openings with true 6-mil polyethylene. Replace filters with new ones following the approved inspection.
- J. Clean the work areas of all visible asbestos debris prior to placing polyethylene sheets or beginning asbestos containment work. Establish critical barriers before beginning clean-up work.
- K. Completely decontaminate all ladders, vacuum cleaners, air machines, and other equipment used during abatement activities prior to removal from the abatement area. Cover all such equipment with true 4-mil polyethylene sheeting and duct tape prior to abatement activity. Seal all openings to air machines with true 6-mil polyethylene prior to their removal from an abatement area and any time they are not in operation. Wrap vacuum cleaner hoses with polyethylene. Seal all open ends of vacuum hoses or intake openings of vacuums with duct tape when not in operation to contain the asbestos. Seal ladder rungs, steps, and sides in polyethylene before use in an abatement area to ensure their complete decontamination following abatement. Clean and completely decontaminate all pump-up sprayers, tools, and equipment following abatement. If they cannot be decontaminated, dispose of them as asbestos material in the AEDC asbestos landfill, which is located approximately 2 miles west of the Avenue E and Sixth Street intersection.

### 3.2 RESPIRATORY PROTECTION REQUIREMENTS

- A. Establish a respiratory protection program as required by ANSI Z88.2, 29 CFR 1910.134 and 29 CFR 1926.1101. The Government will strictly enforce



the OSHA "no facial hair/respiratory policy" for all personnel who wear respirators at any time during the job.

- B. Ensure workers are clean shaven daily immediately preceding their work shift and before wearing respiratory protection.
- C. Provide spectacle inserts to personnel wearing full-face respirators who normally wear spectacles, otherwise they will not be allowed in the containment area. Do not allow contact lenses to be worn in asbestos areas.

### 3.3 PROTECTIVE EQUIPMENT

- A. Use protective equipment that meets all Government standards for use in asbestos abatement. Use coveralls having headcovers and booties attached.

### 3.4 LOCAL EXHAUST SYSTEM

- A. Provide a local exhaust system in the asbestos control area in accordance with ANSI Z9.2. Equip exhaust with absolute HEPA filters. When possible, HEPA-filtered air shall be exhausted to the outside of buildings. Local exhaust equipment shall be sufficient to maintain a minimum pressure differential of minus 0.02 inches of water column relative to adjacent unsealed areas and provide a minimum of four complete air changes per hour. Provide continuous 24-hour-per-day monitoring of the pressure differential with an automatic recording instrument. In no case shall the building exhaust system be used as the local exhaust system for the asbestos control area. Filters on vacuums and exhaust equipment shall conform to ANSI Z9.2. Change HEPA filters at least every 700 hours for 12-inch HEPA filters or more often as required to ensure proper filtration of air. Change pre-filters as soon as visible accumulations occur on the filters, and change intermediate filters at least once per shift. If filter loading occurs (i.e., visible accumulations on prefilter), change more often. Conduct air monitoring during asbestos removal to ensure filter integrity and asbestos levels outside the enclosure remain at or below 0.01 f/cc. Provide and install a back-up HEPA air exhaust ventilation system to be used in the event of primary system failure. Do not use a system with a remote filter housing inside gross removal areas.

### 3.5 COMMUNICATION DEVICES

- A. Do not use any two-way communication devices unless pre-approved by the AEDC Security Forces.

### 3.6 CONFINED SPACES

- A. Ensure entry into confined spaces is consistent with AEDC Safety Standard B5. Before entering a confined space, make oxygen and Lower Explosive Limit (LEL) measurements using a NIOSH-approved O<sub>2</sub>/LEL metering device. While persons are working in a confined space, designate a stand-by person to remain outside who has been trained within the last 12 months in cardiopulmonary resuscitation (CPR) by the American Red Cross or American Heart Association.

### 3.7 ASBESTOS REMOVAL

- A. General: Comply with the rules of Tennessee Department of Environment and Conservation, Chapter 1200-3-11-.02, and 40 CFR 61. The Government will notify the Tennessee Air Pollution Control Board (ref 1200-3-11-.02 [2][d]1[ii] and 2). The removal of asbestos insulation from existing piping or other surfaces shall be subject, but not limited, to the following:
  - 1. Require personnel who work with asbestos to use disposable coveralls; disposable head, neck, and shoe coverings; non-porous gloves; eye goggles; and a NIOSH-approved respirator.
  - 2. Saturate all asbestos materials with wetting agent and ensure the material stays damp during removal. Do not allow asbestos insulation to drop to the floor or ground. Place asbestos in a proper container and lower to the floor or ground as appropriate.
  - 3. Protect all existing machinery, equipment, floors, and walls from contamination by asbestos waste.
  - 4. Control the dispersal of asbestos particles through methods such as isolation and wetting of material before removal. Keep a HEPA-filter vacuum on the job site at all times for use in clean-up of asbestos debris and during glove bag removal.
  - 5. Do not wear protective clothing off the job site or take home for laundering. Provide a decontamination locker room and a clean locker room for personnel required to wear whole-body special clothing. Keep street clothes in the clean locker. While still wearing respirators in the decontamination room, vacuum and remove asbestos-contaminated disposable protective clothing and seal in impermeable bags or containers for disposal. Locate a shower between the decontamination and clean locker rooms and require all employees to shower before changing into street clothes. Filter shower water to 1 micron prior to disposal in a sanitary sewer.

6. Do not smoke, eat, drink, chew tobacco or gum, or apply cosmetics at the job site. Ensure that workers are fully decontaminated prior to conducting any of these activities.
- B. Window glazing requirements: Remove windows containing only asbestos glazing compounds by doing the following in addition to the requirements of other applicable sections of this specification.
1. Establish critical barriers to the general work area by sealing doors, wall penetrations, and ductwork vents as appropriate.
  2. Post the asbestos warning signs.
  3. Using duct tape and polyethylene, seal all exposed asbestos materials to prevent fiber release during window removal.
  4. Pre-clean the windows, seals, floor, and ground as necessary to remove asbestos contamination located in these areas. Outside, clean the ground a distance of approximately 3 feet from the building and 2 feet to the left and right of each set of windows to remove ground contamination. Remove visible debris only.
  5. Remove the windows with care. Wrap each in two layers of 6-mil polyethylene, label as asbestos, and dispose of in the asbestos landfill as described in paragraph 3.10.
  6. Protect all existing finishes, furniture, and fixtures.
  7. Coordinate the window removal with the window replacement.
  8. Ensure compliance for Class II asbestos as stated in 29 CFR 1926.1101.
- C. Window caulking requirements: Remove windows containing asbestos caulking compounds by doing the following in addition to the requirements of other applicable sections of this specification.
1. Establish critical barriers to the general work area by sealing doors, wall penetrations, and ductwork vents as appropriate.
  2. Post the asbestos warning signs.
  3. Pre-clean the windows, sills, floors, and ground as necessary to remove asbestos contamination located in these areas. Outside, clean the ground a distance of approximately 3 feet from the building and 2 feet to the left and right of each set of windows to remove contamination. Remove visible debris only.
  4. Construct mini enclosures on the inside and outside of the windows and exhaust to the outside using HEPA filtration machines.
  5. If asbestos glazing compounds are present, seal all exposed asbestos materials to prevent fiber release. Remove caulking compounds using wet methods and HEPA-filtered vacuums. Clean windows of all caulking materials or dispose of the entire window in the asbestos landfill as described in paragraph 3.10.
  6. Protect all existing finishes, furniture, and fixtures.
  7. Coordinate the window removal with the window replacement.
  8. Ensure compliance for Class II asbestos as stated in 29 CFR 1926.1101.

3.8 AIR MONITORING: Monitor airborne concentrations of asbestos fibers in accordance with 29 CFR 1926.1101 and as specified below:

- A. Monitoring during asbestos work: Provide personnel and area monitoring and establish an 8-hour time-weighted average and 30-minute excursion level concentration during the first exposure to airborne asbestos to document exposure levels and determine respiratory protection requirements. Thereafter, when the same type of work is being performed, provide area monitoring once per work shift inside the asbestos control area, outside the entrance to the asbestos control area, and at the exhaust opening of the local exhaust system. Due to other areas of the building being occupied during asbestos removal, collect samples from all sides of the work area to verify air quality outside the containment. This includes sampling on the second floor above the asbestos work area. Sampling shall be done each shift. If monitoring outside the asbestos control area shows airborne concentrations above 0.01 f/cc, stop all work, notify the Government representative immediately, and correct the condition causing the increase. Provide results of sampling to the Contracting Officer as soon as possible following collection of the sample. A primary calibration standard is the standard of choice. However, a secondary standard may be used if a calibration curve for that standard is on-site in the field with the secondary standard and the curve compared to a primary standard within 3 months of the sample collection date. Conduct air sampling following the current OSHA Sampling Reference Method, which includes field calibration of sample pumps immediately before and after air sampling.
- B. Monitoring after final clean-up: Provide area monitoring of asbestos fibers and establish a quality level of less than 0.01 f/cc after final clean-up but before removing the enclosure of the asbestos control area. If any of the final samplings indicates a higher value, take appropriate action to re-clean the area and repeat the monitoring. Provide sample results to the Contracting Officer prior to removal of any enclosures or barriers.
- C. Provide the results of all air samples as soon as possible following collection and analysis. Include the location of their collection (for example, area [where], personnel [who]), sample number, start and stop times, dates of collection, duration of sampling, flow rate in liters per minute, sample volume, total fiber count, detection limit of the analysis and airborne fiber concentration in fibers per cubic centimeter of air, name of the laboratory, and name of the person analyzing the samples. Make field notes used at the job site during sample collection available at any time to the Government representative upon request.
- D. Should you analyze bulk samples, use a laboratory accredited by NIST. Air samples shall be analyzed by a laboratory which is in full compliance with the

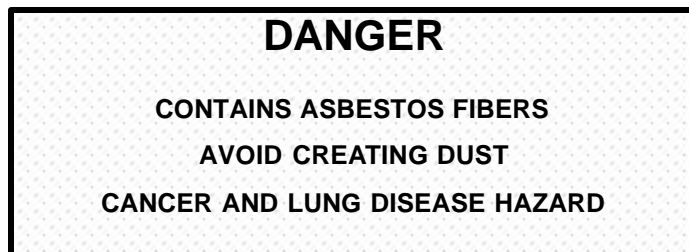
OSHA Reference Method and participates in the required inter-laboratory quality assurance program. Any persons analyzing these samples shall have attended the required NIOSH- and EPA-approved courses and shall have been determined proficient by successful participation in a NIOSH-PAT (air) or NIST program within the last year. This proficiency shall remain current throughout the course of the project. Return bulk samples to AEDC for disposal.

### 3.9 VENTILATION

- A. In a non-gross removal area, ventilate the local areas with a HEPA-filtered air exhaust ventilation system during clean-up of areas greater than 400 square feet or when gross asbestos contamination presents such a hazard to warrant the use of a HEPA local exhaust system to control the hazard. See paragraph 3.1K for clean-up in a gross removal area.

### 3.10 DISPOSAL

- A. Seal asbestos-contaminated material, disposable coveralls, disposable protective equipment, polyethylene, wood, and all other material used for enclosures and scrap in a clear true 6-mil sealed impermeable bag. HEPA vacuum all trapped air from each disposal bag before sealing and place in another true 6-mil labeled, sealed impermeable bag. Bags filled or rebagged at the asbestos landfill do not have to be HEPA vacuumed (see subparagraph C). Label the outer bag with the following warning:



- B. Capture water and fluids used in wet method control and cleaning, and place in labeled, sealed impermeable containers. Label the containers with the same warning required in paragraph 3.10A. Filter water through 1-micron filters before allowing water to pass to a sanitary sewer. Do not place free liquids in the AEDC asbestos landfill.
- C. Dispose of all asbestos waste in the AEDC asbestos landfill. Coordinate times of delivery with the Government representative (normally from 7 am to 1 pm, Monday through Friday). When landfill conditions preclude adequate covering of asbestos, disposal will not be permitted. This determination will be made by the Government representative. These conditions will include, but are not limited to, excessive moisture in the landfill caused by the weather. When this condition occurs, the asbestos will be stored at AEDC at the contractor's

expense until the Government grants disposal authority. Do not dispose of asbestos material in any area other than the asbestos landfill. Remove and dispose of all asbestos dust particles and waste generated during each work period at the end of each work period. Place bagged waste not taken to the landfill at the end of the shift in secure areas, such as a locked panel truck, prepared for disposal as indicated in paragraph 3.11.

- D. Place asbestos materials, which contain sharp edges or are too heavy to be placed in true 6-mil polyethylene bags, in clean, new, or reconditioned, practically air-tight metal drums. Reconditioned drums are drums which have been emptied as specified in 40 CFR 261 and repainted inside and out.
- E. Do not place any hazardous waste, as defined in 40 CFR 261, in any AEDC landfill. Where hazardous waste is generated or removed, follow the procedures given in AEDC Safety Standard E18. Coordinate with the Government representative in completing Forms GC-565 and GC-1337.
- F. All users of the asbestos landfill are required to obtain an AEDC Disposal Permit. (Refer to AEDC Safety Standard E7 for permitting procedure and permit requirements.)
- G. Complete Form GC-1622, AEDC Asbestos Landfill Operators Log and Shipper's Log, for each load of asbestos waste. Form GC-1622 will be provided by the Government representative.
- H. Only properly containerized, labeled, and adequately wet asbestos accompanied by a completed Form GC-1622 and an AEDC Disposal Permit shall be transported to or disposed of in the asbestos landfill.

### 3.11 TRANSPORTATION

- A. Transport properly bagged and identified asbestos waste in a metal panel truck or trailer which is prepared as follows:
  - 1. Bed lined with three layers of true 6-mil polyethylene which overlap walls by at least 12 inches; line the walls with two layers of true 4-mil polyethylene; and line the doors to the enclosed bed lined with two layers of true 4-mil polyethylene.
  - 2. Seal the truck or trailer to prevent any water or contamination leakage.
  - 3. Equip the doors to the lined enclosure with a security lock.
- B. The truck or trailer will be inspected by the Government representative before asbestos is loaded and after disposal.
- C. When transporting asbestos on the open highway, follow current Department of Transportation regulations.

### 3.12 SEALING

- A. Reseal any asbestos material that is not in the job scope for removal but is exposed as part of this work. Seal with a Government-approved bridging encapsulant and insulation mastic to contain and prevent future damage of the asbestos. If outside, ensure material used will withstand weathering.

### 3.13 SAFETY

- A. Ensure the safe passage of persons around the area of demolition. Conduct operations to prevent injury to personnel and damage to existing equipment and structures. Minimize the generation and spread of dust and flying particles.

### 3.14 HAZARD COMMUNICATIONS

- A. Maintain and implement a written Hazard Communications Program as required by 29 CFR 1910.1200 and AEDC Safety Standard A9. Ensure all employees and anyone else involved with the abatement job are familiar with the program and its location. Ensure all other requirements outlined in AEDC Safety Standard A9 are met.

### 3.15 UTILITIES

- A. Do not interrupt existing utilities or commence power outages without written permission from the Contracting Officer or the Government representative. Obtain an AF Form 103, BCE Work Clearance, from the Government representative prior to interrupting utilities. Do not remove asbestos from active steam or electrical lines. Wait for appropriate utility outages. Provide backflow prevention devices as required to prevent cross-contamination of water supplies.

### 3.16 GENERAL CLEAN-UP

- A. Remove dust, dirt, and debris caused by demolition operations from adjacent structures and improvements. Return adjacent areas to their condition prior to the start of the work.

### 3.17 LABELING

- A. Stencil new and replaced insulation with the word "NON-ASBESTOS," in accordance with ASME A13.1, at the edges of replaced sections. Indicate the direction of replacement with arrows using a 1-inch stripe to indicate the boundaries. Place the word "NON-ASBESTOS" at intervals not exceeding 25 feet using a highly visible paint.

- B. Place labels identifying piping systems (e.g., 30 lb. steam, raw water, heated potable water) as appropriate for newly insulated piping systems.

### 3.18 DEBRIS DISPOSAL

- A. Transport debris, rubbish, waste, and other non-asbestos materials resulting from demolition from the site to the construction landfill which is located approximately 2 miles west of the Avenue E and Sixth Street intersection. Do not place edibles or garbage in the construction landfill; use existing dumpster boxes.
- B. Dispose of all material contaminated by asbestos in the asbestos landfill as described in paragraph 3.10.

### 3.19 VISUAL INSPECTIONS

- A. Visually inspect the work area after pre-cleaning and before placing any polyethylene sheeting. Re-clean and inspect any area where cleaning has not been adequately done before placing polyethylene sheeting. Inspect polyethylene enclosures for adequacy prior to removing any asbestos. Do not start abatement procedures prior to release by a Government industrial hygienist who will visually inspect the area for cleanliness and enclosure adequacy.
- B. Assist in the visual inspection of all areas (enclosure areas cleaned, disposal bags, drums, trucks, and equipment used in asbestos removal) as requested by the Government representative. Include the opening of drums and bags or any other inspection activity.

### 3.20 ASBESTOS ABATEMENT COMPLETION

- A. Do not remove protective barricades or enclosures until the Government representative concurs in writing. The Government may conduct independent, aggressive air monitoring at the conclusion of the removal operation to determine air quality. A reading of not more than 0.01 f/cc of air is required before barricades and enclosures shall be removed. The Government representative will visually inspect the affected surfaces for residual asbestos material and accumulated dust, and the contractor shall re-clean all areas showing dust or residual asbestos materials. If re-cleaning is required, monitor the airborne asbestos concentrations after re-cleaning. Remove the decontamination facility from the area following the final visual inspection and upon concurrence by the Government representative. Encapsulate interior of polyethylene walls, ceiling, floor, pipe surfaces, and other surfaces where asbestos has been removed following visual inspection. Keep the area sealed, barriers intact, and HEPA-filtered air exhaust ventilation in operation until the results of final air samples are received. The Government



representative will visually inspect the general work area following enclosure or barrier removal to ensure the work area has been adequately cleaned and to ensure that no damage has been done to buildings or equipment.

END OF SECTION

**PART 1 GENERAL****1.1 SUMMARY**

- A. This section applies to the removal and disposal of lead-containing materials and other heavy metals (barium, cadmium, silver, mercury, and chromium).

**1.2 CODES AND STANDARDS****A. AEDC Safety Standards:**

1. A6 User and Subcontractor Safety, 1996.
2. A9 Hazard Communication, 1996
3. B1 Work Clearances, 2002.
4. E17 Oil and Hazardous Substances Spill Response, 2002.
5. E18 Chemical and Petroleum Products Waste Management, 1998.
6. E19 Lead and Heavy Metals, 1997.

**B. American National Standards Institute (ANSI) Standards:**

1. Z9.2-91 Fundamentals Governing the Design and Operation of Local Exhaust Systems.
2. Z88.2-92 Respiratory Protection.

**C. Code of Federal Regulations (CFR):**

1. 29 CFR 1910.134 Respiratory Protection, 2003.
2. 29 CFR 1910.1200 Hazard Communication, 2003.
3. 29 CFR 1926.55 Gases, Vapors, Fumes, Ducts, and Mists, 2003.
4. 29 CFR 1926.57 Ventilation, 2003.
5. 29 CFR 1926.62 Lead Standard, 2003.
6. 40 CFR 260 Hazardous Waste Management Systems: General, 2002.
8. 40 CFR 261 Identification and Listing of Hazardous Waste, 2002.
9. 40 CFR 262 Generators of Hazardous Waste, 2002.
10. 49 CFR 172 Department of Transportation (DOT) Regulations for Use of Hazardous Materials Tables and for Communication, 2003.
11. 49 CFR 178 DOT Specifications for Packaging, 2003.

**D. Environmental Protection Agency (EPA) Document:**

1. SW-846 Evaluating Solid Waste: Physical/Chemical Methods, 1998.

- E. Steel Structures Painting Council (SSPC) Standard:
  - 1. Guide 7-95                      Guide for the Disposal of Lead-Contaminated Surface Preparation Debris.
- F. Underwriters Laboratories, Inc. (UL) Standard:
  - 1. 586-00                      Safety High-Efficiency, Particulate, Air Filter Units.

### 1.3 DEFINITIONS

- A. Action level: Employee exposure, without regard to use of respirators, to an airborne concentration of lead of 30 µg/m<sup>3</sup> averaged over an 8-hour period. As used in this section, "30 µg/m<sup>3</sup>" refers to the action level.
- B. Area monitoring: Sampling of lead concentrations within the lead-control area and inside the physical boundaries which is representative of the airborne lead concentrations which may reach the breathing zone of personnel potentially exposed to lead.
- C. Change rooms and shower facilities: Rooms within the designated physical boundary around the lead-control area equipped with separate storage facilities for clean protective work clothing and equipment and for street clothes which prevent cross-contamination.
- D. Clearance level: Prior to the moving or removal of enclosures used for lead abatement, air samples will be taken by the Government representative to ensure that airborne levels of lead are at or below 3 µg/m<sup>3</sup>. In addition, a detailed visual inspection will be conducted by the Government representative for all surfaces and equipment in the containment or control area. Surfaces include any portion of the containment including walls, ceilings, and floors, scaffolds, and any equipment or objects that are present in the containment or that have been used in the containment. The inspection will be conducted by wiping a clean cloth across all surfaces and inspecting the cloth for evidence of any dust. If any dust is found on the cloth, the contractor shall re-clean the entire containment until a detailed inspection is passed. All dust will be assumed to be lead- or heavy-metal contaminated. When enclosures are not required, inspection of the work area will be conducted to ensure adequate decontamination of the area. This method will be used before moving or removing containments or enclosures. Before containments are removed from AEDC, wipe and/or microvac samples will be collected from representative surfaces to determine if the containments have been cleaned to a level of 500 µg /ft<sup>2</sup> or less. If any one sample exceeds 500 µg /ft<sup>2</sup>, then the entire containment shall be re-cleaned.
- E. Decontamination room: Room designated for removal of contaminated personal protective equipment (PPE).

- F. Designated lead-abatement supervisor: A person who has attended any 3- to 5-day lead-abatement course taught in the United States. The person shall be knowledgeable of Occupational Safety and Health Administration (OSHA), Environmental Protection Agency (EPA), and other Government regulations.
- G. Eight-hour time weighted average (TWA): Airborne concentration of lead averaged over an 8-hour workday to which an employee is exposed.
- H. Grit blasting: Remove paint with recyclable steel grit or recyclable steel grit embedded in a synthetic open-cell polymer sponge.
- I. High-efficiency particulate air (HEPA) filter equipment: HEPA-filtered vacuuming equipment with a UL 586 filter system capable of collecting and retaining lead-contaminated paint dust. A high-efficiency particulate filter means it is 99.97 percent efficient against 0.3-micron-size particles. This equipment may be containment exhaust systems or hand held paint removal equipment such as peeners, needle-guns, grinders, or sanders.
- J. Lead: Metallic lead, inorganic lead compounds, and organic lead soaps.
- K. Lead-control area: An enclosed area or structure with full containment to prevent the spread of lead dust, paint chips, or debris of lead-containing paint-removal operations. The lead-control area is isolated by physical boundaries to prevent unauthorized entry of personnel.
- L. Lead permissible exposure limit (PEL): Fifty  $\mu\text{g}/\text{m}^3$  as an 8-hour TWA as determined by 29 CFR 1926.62. If an employee is exposed for more than 8 hours in a work day, the PEL shall be determined by the following formula:  
$$\text{PEL } (\mu\text{g lead}/\text{m}^3) = 400/\text{No. hrs. worked per day}$$
- M. Microvac: Alternate sampling method for surfaces that are not conducive to wipe sampling. Sampling is conducted using a 37mm air sampling cassette with 0.8 micron filters at a flow rate of approximately 4 liters per minute. Samples are vacuumed from a 6 in<sup>2</sup> area unless conditions require a smaller or larger sample area. Results will be reported in  $\mu\text{g}/\text{ft}^2$ .
- N.  $\mu\text{g}/\text{m}^3$ : Micrograms per cubic meter of air (refers only to lead in this document).
- O.  $\mu\text{g}/\text{ft}^2$ : Micrograms per square foot of surface (refers only to lead in this document).
- P. Personal monitoring: Sampling of lead concentrations within the breathing zone of an employee to determine the 8-hour TWA concentration in accordance with 29 CFR 1926.62. Samples shall be representative of the employee's work tasks. Breathing zone shall be considered an area within a

hemisphere, forward of the shoulders, with a radius of 6 to 9 inches and the center at the nose or mouth of an employee.

- Q. Physical boundary: Area physically roped or partitioned around an enclosed lead-control area or area where HEPA filtered hand or power tools are used or chemical paint removal is being conducted. The barriers are placed to limit unauthorized entry of personnel. As used in this section, "inside boundary" shall mean the same as "outside lead-control area but within the roped-off area." In areas where enclosures are not used, this is the area where lead abatement work is being conducted.

#### 1.4 SUBMITTALS

- A. Evidence satisfactory to the Contracting Officer that the firm performing lead abatement has at least one designated employee on site during all abatement activity who has attended a lead-abatement course taught in the United States and who is knowledgeable in all aspects of lead abatement. Show this by course certification and description of past lead-abatement experience which includes a list of previous clients and a resume. Have physically on each individual job site at least one such designated supervisor directly responsible for the work whenever any phase of the project is in progress. Multiple enclosures being worked at the same time shall require individual lead-abatement supervisors responsible for each enclosure.
- B. Written certification that all employees involved in lead abatement have received training and medical examinations as required by 29 CFR 1926.62. Certification includes respirator fit-test and training records and a copy of the respiratory protection program. Include with the certifications, dates of the most recent training, medical examinations, and a physician's statement indicating that workers are physically able to perform lead-abatement work and use the required respiratory and general body protection. Provide this information for all personnel including management and any air-monitoring personnel on the job site before their first entry within the job site. Training shall be accomplished prior to the time of initial job assignment. Keep the job information current for all employees during all phases of the job.
- C. Any citation or notice of violation from any Government agency issued as a result of work performed under this contract or any contract engaged in during the last 3 years. Submit a brief explanation of any cited incident. If none have been received, submit certification to that effect.
- D. Environmental, health, and safety plan that addresses all environmental, health, and safety aspects of the job. Submit this plan within 30 calendar days after award of the contract and before any field work begins. The plan shall include the following information:
  - 1. Identification of hazardous waste associated with the work.
  - 2. Estimated quantities of wastes and/or hazardous wastes to be generated and disposed of.

3. Names and qualifications (experience and training) of personnel who will be working on site with hazardous waste.
  4. List of the waste-handling equipment to be used in performing the work, to include cleaning, volume-reduction, and transport equipment.
  5. Spill prevention, containment, and clean-up contingency measures to be implemented. Reference AEDC Safety Standard E17.
  6. Work plan and schedule for waste containment, removal, and disposal. Waste shall be cleaned up and containerized daily.
  7. Methods to control fugitive air emissions.
  8. Methods to control employee exposure to lead during removal.
  9. Methods to ensure safety including a lockout/tagout plan; job safety analysis; tool box safety meeting minutes; accident reports and investigations; lead-testing data/certification; fall protection systems; shop drawings; procedures for disposing waste, scrap, and excess materials; and procedures for work involving transportation or disposal of hazardous waste. The plan shall address all other environmental, health, and safety concerns associated with the job. The plan shall also include fire safety plan and procedures for addressing other work area emergencies in compliance with 29 CFR 1926.55, and a hazardous waste management plan in accordance with 40 CFR 260 and with applicable requirements of federal and local hazardous waste regulations.
- E. A copy of the hazard communications program and certification that all employees have been trained concerning the hazard communications standards and the written program in accordance with 29 CFR 1910.1200 and AEDC Safety Standard A9.
- F. A list of products to be used and a Material Safety Data Sheet (MSDS) for each. Products include, but are not limited to, aerosol sprays of any kind, wetting and cleaning agents, fuels, solvents, paints, etc. MSDS's shall be kept in a notebook and indexed for easy reference. This MSDS notebook shall remain available to all employees on the job site at all times.
- G. A detailed job-specific plan of the work procedures to be used in the removal of lead paint. The plan shall include a sketch showing the locations, size, and details of lead-control areas and the location and details of decontamination rooms, change rooms, shower facilities, and mechanical ventilation systems. Include eating, drinking, smoking, and restroom procedures; interface of trades; sequencing of lead-related work; collected wastewater (to include shower water) and paint debris disposal plan; air sampling plan; respirators; protective equipment; and a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 3  $\mu\text{g}/\text{m}^3$  are not exceeded outside the lead-control area. Include air sampling, training, strategy, sampling methodology, frequency, duration of sampling, and qualifications of air-monitoring personnel in the air-sampling portion of the plan. Obtain approval of the plan prior to the start of paint-removal work.

- H. Air and substrate sampling reports.
- I. Testing laboratory qualifications including the name, address, and telephone number of the testing laboratory selected to perform the monitoring, testing, and reporting of airborne and substrate concentrations of lead. The laboratory shall be accredited by the American Industrial Hygiene Association (AIHA). Provide AIHA documentation along with date of accreditation/re-accreditation. Samples collected to determine if materials are hazardous waste shall be analyzed by a laboratory qualified to conduct such analysis following Environmental Protection Agency Document SW-846. Provide split samples of any materials or media to the Government as requested for Government analysis.
- J. Air-monitoring results submitted within 24 hours following the monitoring, signed by the person performing the air monitoring, the employee who analyzed the sample, and the designated site superintendent responsible for the lead-abatement operation. See paragraph 3.2.B.3 for additional information.
- K. A list of all equipment, including water, air filters, and respirators to be used, and manufacturer's literature showing that the equipment and material meet all EPA, OSHA, and ANSI standards for use in lead-abatement activities. Include certification that vacuum- and air-filtration devices are filtered with HEPA filters. Include operating instruction for paint-removal equipment.
- L. Equipment rental notifications (see paragraph 1.5C).
- M. Shower water sample test results.

## 1.5 EQUIPMENT

- A. Respiratory protection requirements: Establish a respiratory protection program as required by ANSI Z88.2, 29 CFR 1910.134 and 29 CFR 1926.62. The Government will strictly enforce the OSHA "no facial hair/respiratory policy" for all personnel who wear respirators at any time during the job.
  - 1. Ensure workers are clean shaven daily immediately preceding their work shift and before wearing respiratory protection.
  - 2. Provide spectacle inserts to personnel wearing full-face respirators who normally wear spectacles; otherwise, spectacles shall not be worn in lead-abatement areas.
- B. Special protective clothing: Furnish personnel who will be exposed to lead-contaminated dust with appropriate disposable protective whole-body clothing, head coverings, gloves, and foot coverings. Use coveralls having head covers and booties attached. Furnish appropriate disposable plastic or rubber gloves to protect hands. Reduce the level of protection only after obtaining concurrence from the Government representative.

- C. Rental equipment notification: If rental equipment is to be used during lead-containing paint handling and disposal, notify the rental agency in writing concerning the intended use of the equipment. Furnish a copy of the written notification to the Contracting Officer (see paragraph 1.4L).
- D. Vacuum and negative air machine filters: UL 586-labeled HEPA filters.
- E. Decontamination: Completely decontaminate all ladders, vacuum cleaners, air machines, and other equipment used during abatement activities prior to removal from the abatement area. If they cannot be decontaminated, then dispose of them as hazardous waste.
- F. Condition: Clean all equipment used at non-AEDC job sites prior to arrival at AEDC. Any contaminated equipment identified during inspection of incoming vehicles shall be removed from AEDC until cleaned. Any such equipment shall not be cleaned at AEDC. Do not remove any equipment used at AEDC that has not been decontaminated and inspected by the Government representative. All equipment and other articles are subject to inspection by Government representatives upon arrival or exit from AEDC. Contaminated equipment identified on out-going vehicles will be impounded by the Government until the contractor conducts adequate decontamination procedures.

## **PART 2 PRODUCTS**

### **2.1 ABRASIVE MATERIALS (If applicable)**

- A. Abrasive blasting materials shall meet the requirements as specified in the paint schedule under "Surface Preparation."
- B. Limits on the composition of abrasive materials: The soluble metal content and the total metal content shall not exceed values which would cause a material to be classified as a hazardous waste as defined in 40 CFR 261.

## **PART 3 EXECUTION**

### **3.1 PROTECTION**

- A. Notification: Notify the Government representative 30 days prior to the start of any paint-removal work.
- B. Lead-control area requirements:
  - Establish a lead-control area by completely enclosing the area or structure where lead-containing paint-removal operations are to be performed or isolate using barrier ropes and signs if containment is not required.
  - 2. When enclosures are not required, place polyethylene sheeting on the ground or floor of the work area and out from the building a distance of



at least twenty feet. Cover non-moveable objects with protective covering such as polyethylene. Close and tightly lock doors and windows when working near doors or windows. Protect brick and walls from contamination and remove prior dust and debris by HEPA vacuum and wet wiping. If doors and windows will not tightly close, seal with polyethylene from the inside of the building. If storm windows must be removed to allow repainting of windows, wet wipe and HEPA vacuum the entire storm window (both sides) to remove any lead contamination.

3. When building occupants are allowed to remain in the premises provide a safe, lead free access to and from the building during the work and at the end of the day. Provide adequate security to the work area and equipment to prevent any hazard to the area occupants.
4. Contain removal operations by the use of a negative-pressure full-containment system. Also see paragraph 3.1.I.
5. Enclosures used to control lead emissions shall consist of the lead-abatement work area, and a decontamination unit for personnel, consisting of a dirty equipment room, a shower equipped with hot and cold running water, and a clean change room for workers. A separate decontamination chamber shall be constructed for equipment decontamination and the safe passage of hazardous wastes from the work area to the outside. Removal of contaminated dust-collecting filters from the recycling abrasive blasting and vacuuming machines shall be accomplished in a manner to prevent the contaminated dust from entering the environment. All personnel assigned to changing filters and cleaning the machinery shall be fully clothed with approved protective clothing and equipment. The clean room shall be equipped with lockers where clean respirators and street clothes are stored. No contaminated articles shall enter the clean room. Contaminated articles shall remain in the work area until cleaned or disposed of as hazardous waste. The decontamination units shall be constructed contiguous to the work area (enclosure), and the shower shall be constructed in a manner that requires the worker to pass from the dirty room through the shower stall into the clean room.
6. Filter shower water through a 1-micron filter or other filter system that will result in equivalent water filtration. Collect water and sample to determine if lead levels in the water are below 100 ppb if tested by a qualified laboratory or 50 ppb if tested by an approved field kit. If levels are below these concentrations, then the water may be discharged into the sanitary sewer. All water shall be collected and sampled before discharge using either a field measuring kit as described below or the results from a qualified laboratory. Sample results from the qualified laboratory shall be submitted to the Contracting Officer for approval prior to discharging the water. The Government representative may collect and test duplicate samples to ensure the integrity of the qualified laboratory performing the analysis. Field analysis conducted using portable test kits will be approved by the Government industrial hygienist prior to use. Colorimetric test kits such as CHEMetrics, Inc., Cat. No. K-8350, are such kits. Any water tested using field kits that indicates lead

levels above 50 ppb shall be re-filtered and re-tested until field measurements are below 50 ppb or the water has been found to be less than 100 ppb using laboratory testing from a qualified laboratory. Sample results from the qualified laboratory shall be submitted to the Contracting Officer for approval prior to discharging the water. If field analysis is used, a Government representative will be present during all testing and field analysis. The holding tank used for the collection of contaminated water will be locked and unlocked by the Government representative to prevent the release of contaminated water to the environment before adequate filtering. The contractor shall provide the means of locking the tank; however, the Government representative will provide the lock.

7. Enclosures used for lead abatement shall be constructed of materials strong enough to withstand environmental elements (i.e., wind, rain, and snow) when outside. The containment shall comply with a Class 1 containment system as described in SSPC Guide 7 (CON). The containment shall be made of impermeable walls with rigid or flexible framing, fully sealed joints, airlock entryways, and HEPA-filtered negative air achieved by forced air flow (verified by instrument monitoring). Air flow in the containment shall be maintained at a pressure differential of minus 0.02 inch of water. Air flow in the containment shall be maintained at a minimum of 100 ft/min for the cross draft ventilation and at least 60 ft/min for the down draft ventilation. Construct hygiene facilities for decontamination of workers and equipment similar to the main containment. Construct doors so that flaps completely isolate the enclosure in the event of air exhaust failure and allow easy access for personnel and equipment. The clean room shall be large enough to accommodate at least three workers at any one time. Prevent direct viewing into the shower, clean room, or dirty room by other personnel by constructing the walls and ceiling of these areas of black polyethylene or similar material. Provide detailed specifications, drawings, and load calculations of containment structure for 100 percent containment of lead emissions, grit, and dust. If the containment is to be used for abrasive blasting, blast shields shall be used to protect the outside walls of the containment from damage by blast media.
- C. Protection of existing work to remain: Perform paint removal work without damage or contamination of adjacent areas. Where existing work is damaged or contaminated, restore work to its original condition or better.
  - D. Boundary requirements: Provide physical boundaries around the lead-control area by roping off the area. Ensure that airborne concentrations of lead will not exceed 3 µg/m<sup>3</sup> outside the lead-control area or enclosure.
  - E. Change room and shower facilities: Provide clean change rooms and shower facilities within the physical boundary around the designated lead-control area in accordance with requirements of 29 CFR 1926.62 and as outlined in paragraph 3.1.

- F. Mechanical ventilation system:
  1. Use adequate ventilation to control personnel exposure to lead in accordance with 29 CFR 1926.57.
  2. Local exhaust system: Provide a local exhaust system in the lead-abatement area (enclosure) in accordance with ANSI Z9.2. Equip exhaust with absolute HEPA filters. HEPA-filtered air will be exhausted to the outside of buildings when work is conducted inside buildings. Local exhaust equipment shall be sufficient to maintain a minimum pressure differential of minus 0.02 inches of water column relative to adjacent unsealed areas. Provide continuous 24-hour-per-day monitoring of the pressure differential with an automatic recording instrument. Filters on vacuums and exhaust equipment shall conform to ANSI Z9.2. Change pre-filters and HEPA filters often enough to ensure that lead concentrations at the exhaust are at or below 3 µg/m<sup>3</sup>. Provide and install a back-up HEPA air-exhaust ventilation system to be used in the event of primary system failure. Do not use a system with a remote filter housing inside the lead-removal area.
  
- G. Personnel protection: Personnel shall wear and use protective clothing and equipment as specified herein. Eating, smoking, and/or drinking are not permitted in the lead-control area. No one shall be permitted in the lead-control area unless they have received appropriate training and protective equipment.
  
- H. Warning signs: Provide warning signs at approaches to lead-control areas. Locate signs at such a distance that personnel may read the sign and take the necessary precautions before entering the area. Signs shall comply with the requirements of 29 CFR 1926.62.
  
- I. During building renovations where abrasive blasting is not used and paint must be removed by other means, such as HEPA-shrouded mechanical removal equipment, critical barriers and polyethylene enclosures may be used. The requirement for showers and HEPA negative pressure exhaust shall be dependent on air concentrations. If air concentrations are below the action level for lead, then showers shall not be required. Hand and face washing facilities shall be required. Submit methods of removal and control as required in paragraph 1.4.D. If work is done outside, then air concentrations within the work area shall be within acceptable limits as indicated in paragraph 3.1.D. above. Submit methods of removal and control as required in paragraph 1.4.D.

### 3.2 WORK PROCEDURES

- A. Perform removal of lead-containing paint in accordance with the approved lead-containing paint removal plan. Use procedures and equipment required to limit occupational and environmental exposure to lead when lead-containing paint is removed in accordance with 29 CFR 1926.62 and 40 CFR 262, except as specified herein. (Dispose of removed paint chips and

associated waste in compliance with federal and local requirements.) The hazardous waste shall be properly drummed and labeled as required by 49 CFR 172 prior to being moved by the contractor to an accumulation point, which is within one mile of the job site (see paragraph 3.9F).

1. Personnel exiting procedures: Whenever personnel exit the lead-controlled area, they shall perform the following procedures and shall not leave the work place wearing any clothing or equipment worn during the work day:
    - a. Vacuum themselves.
    - b. Remove protective clothing in the decontamination room, and place them in an approved impermeable 6-mil polyethylene disposal bag.
    - c. Shower.
    - d. Change to clean clothes prior to leaving the physical boundary designated around the lead-contaminated job site.
- B. Air monitoring: Monitor airborne concentrations of lead in accordance with 29 CFR 1926.62 and as specified below:
1. Monitoring during lead-abatement work: Provide personnel and area monitoring and establish an 8-hour TWA during the first exposure to airborne lead to document exposure levels and determine respiratory protection requirements. Provide continuous area monitoring during each work shift inside the lead-control area, outside the entrance to the lead-control area, and at the exhaust opening of the local exhaust system. If monitoring outside the lead-control area shows airborne concentrations above 3.0  $\mu\text{g}/\text{m}^3$ , stop all work, notify the Government representative immediately, and correct the condition causing the increase. Conduct air sampling following OSHA and NIOSH guidelines which includes field calibration of sample pumps immediately before and after air sampling.
  2. Collect personal air-monitoring samples on employees who are anticipated to have the greatest risk of exposure. In addition, take air-monitoring samples on at least 25 percent of the work crew or a minimum of two employees, whichever is greater, during each work shift.
  3. Submit the results of all air samples taken in support of the contract within 10 days following their collection. Include the location of their collection (for example, area [where], personnel [who], sample number, start and stop times, dates of collection, duration of sampling, flow rate in liters per minute, sampling volume, total lead concentration in  $\mu\text{g}/\text{m}^3$ , detection limit of the analysis, TWA of the representative employee's exposure, name of the laboratory, and name of the person collecting the sample and analyzing the samples). This information shall be submitted in a formal report to the Contracting Officer. Within 24 hours of sample collection, make the sampling available for the Government representative's review. These may be laboratory reports or rough draft field data. Make field notes used at the job site during sample collection available at any time to the Government representative. Notify the Contracting Officer immediately of exposure to lead at or in excess of 3  $\mu\text{g}/\text{m}^3$  outside the lead-control area.

4. Monitoring after final clean-up: Provide area monitoring of lead concentrations and establish an air quality level of 3 µg/m<sup>3</sup> or less after final clean-up. Before moving or removing the enclosure from the lead-abatement control area, the Government representative will conduct a visual inspection of the area to determine its cleanliness. Once the visual inspection has been passed, the Government representative will collect clearance air samples to determine lead air concentrations. If the air samples indicate levels above 3 µg/m<sup>3</sup>, then the contractor shall re-clean the enclosure, and the visual inspection and clearance air sampling shall be repeated. This shall continue until an inspection is passed and a clearance sample is obtained. The contractor shall assist the Government representative to ensure adequate inspection of all surfaces of the enclosure and work areas. See paragraph 1.3.D.
- C. Once the visual inspection and air samples meet necessary requirements, remove the enclosure.

### 3.3 LEAD-CONTAINING PAINT REMOVAL

- A. Comply with the applicable procedure in Annex B, AEDC Safety Standard E19 and the following: Manual or power sanding/grinding of interior and exterior surfaces is not permitted unless accomplished in enclosure or done so using proper barriers, signs, HEPA vacuum attachments on equipment, and wet methods. Also see paragraph 3.1.B. and I. Remove paint within the areas as required to allow cutting or painting as identified under scope of lead abatement in section 1.1B. on the drawings and in the paint schedule in order to completely expose the substrate. Take whatever precautions are necessary to minimize damage to the underlying substrate if painting.
1. Mechanical paint removal and blast cleaning: Perform mechanical paint removal and blast cleaning in lead-control areas using negative-pressure full-containment with HEPA-filtered exhaust. Collect paint residue and spent grit (used abrasive) from blasting operations for disposal in accordance with CFR and local requirements.
  2. Abrasive blasting and vacuum filtering system: The system used to collect residue paint and grit blast shall be contained in a HEPA-filtered exhausted enclosure to ensure that the emptying of residue, the maintenance of systems, and/or the replacement of filters are done in an enclosed restricted area that shall prevent the contamination of the outside work area. This enclosure area shall be constructed in accordance with the requirements for the main enclosure and will be inspected and cleared by the Government representative prior to its removal as indicated in paragraph 3.10.
- B. Do not conduct paint removal if wind speeds at the job site are greater than 20-miles per hour unless paint removal is being accomplished by chemical methods. In addition, work must stop and cleanup of all debris must occur before any precipitation begins.

- C. Do not leave debris on polyethylene or other parts of the work area overnight even if the work is not complete. Clean up all debris and contaminated polyethylene at the end of each shift.

### 3.4 CLEARANCE PRIOR TO PRIMER APPLICATION

- A. Before primer application, a detailed visual inspection will be conducted by the Government representative for unprepared surfaces and visible dust. Any visible dust will be assumed to be lead contaminated. See paragraph 1.3.D. The work area including enclosure floors, walls, and ceiling shall be cleaned. If visible dust or unprepared surfaces are identified, the work area shall be re-cleaned and the inspection will be repeated. The outer enclosure shall remain intact and HEPA-filtered exhaust shall be maintained until final clearance air and inspection is conducted before enclosure removal as indicated in paragraph 3.10. Any personnel entering the work area are required to wear protective coveralls, head cover, gloves, and other necessary equipment including respirator until final clearance sampling of 3 µg/m<sup>3</sup> is obtained.

### 3.5 SAFETY

- A. Ensure the safe passage of persons around the area of work. Comply with AEDC Safety Standard A6. Conduct operations to prevent injury to personnel and damage to existing equipment and structures.

### 3.6 UTILITIES

- A. Do not interrupt existing utilities or commence power outages without written permission from the Government representative. Obtain an approved, AF Form 103, BCE Work Clearance, in accordance with AEDC Safety Standard B1, from the Government representative prior to interrupting utilities. Do not remove lead from active steam, electrical lines, or high-pressure lines. Wait for appropriate utility outages. Provide back flow prevention devices as required to prevent cross-contamination of water supplies.

### 3.7 COMMUNICATION DEVICES

- A. Do not use any two-way communication devices unless pre-approved by the AEDC Security Forces.

### 3.8 WORK CLEARANCES

- A. Obtain work clearances as required by AEDC Safety Standard B1. Perform hazard analysis to ensure all possible health hazards (e.g., toxic gases) have been evaluated and properly controlled. Before entering into a work space, make oxygen and Lower Explosive Limit (LEL) measurements using an NIOSH-approved O<sub>2</sub>/LEL metering device. While persons are working, designate a stand-by person, who has been trained within the last 12 months

in cardiopulmonary resuscitation (CPR) by the American Red Cross or American Heart Association, to remain outside.

### 3.9 CLEAN-UP AND DISPOSAL

- A. Clean-up: Maintain surfaces of the lead-control area free of accumulations of paint chips and dust. Restrict the spread of dust and debris; keep waste from being distributed over the work area. Do not dry sweep or use compressed air to clean up the area. At the end of each shift and when the paint-removal operation has been completed, clean the area of visible lead paint contamination by vacuuming with a HEPA-filtered vacuum cleaner. Prevent ground contaminants by enclosing the work area as specified in paragraph 3.1.B. Pre-clean the ground or floor of visible paint chips and obvious visible lead contamination prior to enclosure construction to remove visible contamination already present in the work area.
- B. Visual inspections: Visually inspect the work area after pre-cleaning and before placing any polyethylene sheeting. Re-clean and inspect any area where cleaning has not been adequately done before placing polyethylene sheeting. Inspect enclosures for adequacy prior to removing lead. Do not start abatement procedures prior to release by a Government industrial hygienist who will visually inspect the area for cleanliness and enclosure adequacy.
- C. Inspection assistance: The designated lead-abatement supervisor shall assist in the visual inspection of all areas (enclosure areas cleaned, drums, trucks, and equipment used in lead abatement) as requested by the Government representative. This includes any inspection activity required.
- D. Testing of lead-containing paint residue and used abrasive: Where indicated or when directed by the Government representative, test lead-containing paint residue and used abrasive in accordance with 40 CFR 261 and AEDC Safety Standard E18.
- E. Non-hazardous debris disposal: Transport debris, rubbish, demolition waste, and other non-hazardous materials resulting from work from the site to the construction landfill which is located approximately 2 miles west of the intersection of Avenue E and 6th Street. Do not place edibles or garbage in the construction landfill; use existing dumpster boxes. Dispose of all material contaminated by lead as hazardous waste in compliance with AEDC Safety Standard E18.
- F. Hazardous waste disposal:
  - 1. Where hazardous waste (as identified or listed by 40 CFR 261) is generated, follow the procedures given in AEDC Safety Standard E18 for storing and turning in hazardous waste. These procedures include the requirement for completion of Forms GC-565 and GC-1337, which will be furnished by the Government representative. Return the

completed forms to the Government representative prior to transporting the drums to the accumulation point.

2. Collect lead-contaminated waste, scrap, debris, bags, containers, equipment, and clothing, which may produce airborne concentrations of lead particles.
3. Store removed paint, lead-contaminated clothing and equipment, and lead-contaminated dust and cleaning debris into U. S. Department of Transportation 49 CFR 178-approved 55-gallon drums which shall be provided by the contractor. Test the contents to determine the hazardous characteristics, and submit the test results to the Government representative as described in subparagraph 1 above. The contractor shall label and move the waste to a designated accumulation point in accordance with 40 CFR 262 and 49 CFR 172. The Government will be responsible for the further transportation and disposal of the waste.
4. Do not place any hazardous waste, as defined in 40 CFR 261, in any AEDC landfill.

### 3.10 LEAD ABATEMENT COMPLETION

- A. Samples and tests: Do not remove protective barricades or enclosures until concurrence is received in writing from the Government representative. The Government representative will visually inspect the surfaces of both the enclosure and abated substrate for visible dust contamination, and the contractor shall re-clean all areas as required. Also see paragraph 1.3.D. Wipe and/or microvac samples will be collected to determine that the lead surface contamination does not exceed 500  $\mu\text{g}/\text{ft}^2$  of surface. If any wipe and/or microvac samples do not meet this criterion, re-clean the entire work area. If re-cleaning is required, monitor airborne lead concentrations during and after re-cleaning. Once the visual inspection has been made and wipe and/or microvac samples indicate clean surface levels, clearance air monitoring will be accomplished. If airborne lead concentrations exceed 3  $\mu\text{g}/\text{m}^3$ , re-clean the area. Clearance monitoring will be repeated by the Government representative as necessary. HEPA-filtered air systems shall be operated continually until adequate clearance levels are met. In addition to air and wipe samples, soil, gravel, and water samples will be taken in the work area to determine that lead contamination in the area is no greater than 3.7 parts per million above pre-construction levels in soil and gravel or 100 parts per billion in water regardless of the pre-construction levels. Sample results below these limits are required before enclosures or barricades are removed. Shower water shall be sampled prior to disposal to ensure that the 100-parts-per-billion level is met. See paragraph 3.1.B.4. Analysis of air and wipe samples collected and tested by the Government representative may take 1-1/2 to 3 work days, with bulk and water analysis taking up to 5 work days. Keep the area sealed, barriers intact, and HEPA-filtered air exhaust ventilation in operation until the results of final air samples are received.



- B. Work area inspection: The Government representative will visually inspect the general work area following enclosure removal to ensure the work area has been adequately cleaned and to ensure that no damage has been done to buildings, structures, or equipment.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Clearing site of plant life and grass for access to and provision of piezometers.
- B. Removing trees and shrubs.

**1.2 DEFINITIONS**

- A. Clearing: Clearing is defined as the felling, trimming, and cutting of trees into sections and the disposal of the trees and other vegetation designated for removal, including down timber, snags, brush, and rubbish occurring in the areas to be cleared.
- B. Grubbing: Grubbing is defined as the removal and disposal of stumps, roots larger than three inches in diameter, and matted roots from the designated grubbing areas.

**1.3 SUBMITTALS.** Furnish the following submittals (four copies each):

- A. Site clearing plan: Subdivided showing areas of clearing for orderly progression of clearing work with dates of commencement and completion for each area; including work elements and types of equipment.
- B. Storm Water Pollution Prevention/Erosion Control Plan (SWPP/EC).
- C. NPDES Storm Water Construction Notice of Intent.
- D. NPDES Storm Water Construction Notice of Termination.
- E. Payment of Storm Water Construction Fee receipt.
- F. Tennessee "WEC" (Weed Control - Right of Way and Industrial) Pest Control Certification in compliance with TDEC Rule 0080-6-14.

**1.4 REGULATORY REQUIREMENTS**

- A. Code of Federal Regulations (CFR):
  - 1. 40 CFR 9, NPDES – Regulations for Revision of the Water 122,123, and 124 Pollution Control Program Addressing Storm Water Discharges, 2002.

- B. Tennessee Code Annotated (TCA):
  - 1. 69-3-108 Tennessee Water Quality Control Act of 1977.
- C. Tennessee Department of Environment and Conservation (TDEC):
  - 1. Chapter 0080-6-14 Pest Control Operators, 1999.
  - 2. Chapter 1200-4-10 National Pollutant Discharge Elimination System General Permits, 2000.

**PART 2 PRODUCTS – None.**

**PART 3 EXECUTION**

**3.1 PREPARATION**

- A. Verify that existing items designated to remain, are tagged or identified.
- B. Provide SWPP/EC plan complying with 40 CFR Parts 9,122,123 and 124; TDEC Rule 1200-4-10 and TCA 96-3-108. Pay fees as required.

**3.2 PROTECTION**

- A. Locate, identify, and protect utilities that remain, from damage.
- B. Protect trees, plant growth, and features designated to remain, as final landscaping.
- C. Protect benchmarks and existing structures from damage or displacement.

**3.3 CLEARING**

- A. Provide storm water pollution prevention and erosion control complying with the SWPP/EC plan.
- B. Clear areas required for access to site and execution of work.
- C. Remove trees and shrubs indicated.
- D. Clear undergrowth and deadwood, without disturbing subsoil.

**3.4 REMOVAL**

- A. Remove debris, rock, and extracted plant life from site.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Excavating trenches for conduits.
- B. Compacted bedding under fill over conduits.

**1.2 FIELD MEASUREMENTS**

- A. Verify that survey benchmark and intended elevations for the work are as shown on drawings.

**PART 2 PRODUCTS****2.1 PLASTIC MARKING TAPE**

- A. Acid- and alkali-resistant polyethylene film, 6-inches wide with a minimum thickness of 0.004 inch and a minimum strength of 1,750 pounds per inch (psi) lengthwise and 1,500 psi crosswise; having integral wires or foil backing to enable detection by a metal detector when buried up to 3-feet deep and having continuous inscriptions describing the specific utility according to the following colors:
  - 1. Electric: Red
  - 2. Gas, oil, dangerous materials: Yellow
  - 3. Telephone, telegraph, television, fire, and police communications: Orange
  - 4. Water systems: Blue
  - 5. Sewer systems: Green

**PART 3 EXECUTION****3.1 EXAMINATION**

- A. Verify fill materials to be reused, are acceptable.

**3.2 PREPARATION**

- A. Identify required lines, levels, contours, and datum.
- B. Maintain and protect existing utilities remaining, which pass through work area.
- C. Protect plant life, lawns, and other features remaining as a portion of final landscaping.

- D. Protect bench marks, sidewalks, paving, and curbs from excavation equipment and vehicular traffic.
- E. Protect above and below grade utilities which are to remain.
- F. Cut out soft areas of subgrade not capable of in-situ compaction. Backfill and compact to density equal to or greater than requirements for subsequent backfill material.

### 3.3 EXCAVATION

- A. Excavate subsoil required for piezometer conduits.
- B. Cut trenches sufficiently wide to enable installation of utilities and allow inspection.
- C. Excavation shall not interfere with normal 45 degree bearing splay of existing foundations.
- D. Hand trim excavation.
- E. Remove lumped subsoil, boulders, and rock (2 inches and larger).
- F. Correct unauthorized excavation.
- G. Correct areas over-excavated by error with approved bedding material.
- H. Wherever trenches are cut across or along existing pavement, temporarily pave the backfill by placing crushed stone, chert, or gravel as the top 6 inches of backfill. Maintain this backfill until permanent pavement is restored.

### 3.4 BEDDING

- A. Support pipe during placement and compaction of bedding fill.

### 3.5 BACKFILLING

- A. Backfill trenches to contours and elevations with unfrozen materials.
- B. Systematically backfill to allow maximum time for natural settlement. Do not backfill over porous, wet, frozen, or spongy subgrade surfaces.
- C. Employ a placement method that does not disturb or damage foundation perimeter drainage, conduit duct in trench, and buried utilities.
- D. Maintain optimum moisture content of backfill materials to attain required compaction density.

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### 3.6 PROTECTION OF FINISHED WORK

- A. Protect finished work.
- B. Re-compact fills subjected to vehicular traffic.

END OF SECTION

**PART 1 GENERAL**

- 1.1 SUMMARY: Provide repairs for Elk River Dam concrete bridge deck. The extent of the work is shown on the drawings.
- 1.2 CODES AND STANDARDS: The publications listed below form a part of this specification to the extent referenced and have the same force and effect as if bound into the contract documents:
- A. American Society for Testing and Materials (ASTM) Specifications:
    - 1. C109-02                      Compression Strength of Hydraulic Cement Mortars.
    - 2. C666-97                      Resistance of Concrete to Rapid Freezing and Thawing.
    - 3. E329-02                      Agencies Engaged in the Testing and/or Inspection of Materials Used in Construction.
  - B. Tennessee Department of Transportation Standard Specifications for Road and Bridge Construction (SSRBC), 1995:
- 1.3 LABORATORY TESTING SERVICES: The testing laboratory shall meet the basic requirements of ASTM E329.
- 1.4 SUBMITTALS: Provide the following submittals (four copies each):
- A. Manufacturer's product data for epoxy grout.
  - B. Polymer modified concrete mix design.
  - C. Test reports for concrete.
  - D. Manufacturer's product data for backer rod and silicone sealant.
  - E. Manufacturer's product data for polymer modified concrete.
  - F. Manufacturer's product data for thermoplastic pavement marking.

**PART 2 PRODUCTS**

- 2.1 Provide materials complying with SSRBC unless otherwise specified.
- 2.2 GROUT: fast setting hydraulic cement, 5500 pounds per square inch (psi) in one day, 6500 psi in seven days per ASTM C109, 100 percent relative durability factor per ASTM C666, Five Star Products Highway Patch or approved equal.

- 2.3 Provide polymer cement concrete with polymer latex compatible with existing surface and grout repair products.

### **PART 3 EXECUTION**

- 3.1 Provide temporary traffic control devices accordance with SSRBC Section 712. Do not begin work until traffic control devices are in place. Comply with AEDC Aquatic Resource Alteration Permit (ARAP) requirements.
- 3.2 Seal joints with silicone sealant and backer rods in accordance with SSRBC Section 501.
- 3.3 Remove spalled concrete in the areas indicated by providing 2-inch-deep vertical saw-cuts in sound concrete outside the spalled area. Remove deteriorated concrete. Clean and prepare the existing concrete surface and place concrete patch material in accordance with the manufacturer's requirements. Provide top of patch to match top of existing pavement elevations. Do not allow traffic on the patch until the concrete has attained a compressive strength of 3000 psi.
- 3.4 Provide polymer modified bridge deck overlay in accordance with SSRBC Section 619 and the manufacturer's requirements.
- 3.5 Provide thermoplastic pavement markings in accordance with SSRBC Section 716.
- 3.6 Remove temporary traffic control devices after completion of work.
- 3.7 Provide testing in accordance with SSRBC Section 903.21. Provide a minimum of 3 compression tests for each day's placement of concrete.
- 3.8 Dispose of demolished materials in the AEDC Construction Landfill located about 2.2 miles from the intersection of Sixth Street and Avenue E.

END OF SECTION



**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Preparation of subsoil.
- B. Placing topsoil.
- C. Seeding, mulching and fertilizing.

**1.2 QUALITY ASSURANCE**

- A. Furnish seed mixture in containers showing percentage of seed mix, year of production, net weight, date of packaging, and location of packaging.

**1.3 DELIVERY, STORAGE, AND PROTECTION**

- A. Deliver grass seed mixture in sealed containers. Seed in damaged packaging is not acceptable.
- B. Deliver fertilizer in waterproof bags showing weight, chemical analysis, and name of manufacturer.

**PART 2 PRODUCTS****2.1 SEED MIXTURE**

- A. Seed mixture:
  - 1. Kentucky 31 Fescue: 70 percent; Crown Vetch: 25 percent; and English Rye: 5 percent.

**2.2 SOIL MATERIALS**

- A. Topsoil: From excavated topsoil stockpile. Fertile, agricultural soil, typical for locality, capable of sustaining vigorous plant growth, taken from drained site; free of subsoil, clay or impurities, plants, weeds and roots; pH value of minimum 5.4, and maximum 7.0.

**2.3 ACCESSORIES**

- A. Mulching material: Dry oat or wheat straw, free from weeds and foreign matter detrimental to plant life. Hay or chopped cornstalks are not acceptable.

- B. Fertilizer: Recommended for grass, with 50 percent of the elements derived from organic sources; of a proportion necessary to eliminate any deficiencies of topsoil in the following proportions: nitrogen 12 percent, phosphoric acid 4 percent, soluble potash 8 percent.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Verify that prepared soil base is ready to receive the work of this section.

#### **3.2 PREPARATION OF SUBSOIL**

- A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles, and contours. Make gradual changes in grade. Blend slopes into level areas.
- B. Remove foreign materials, weeds, and undesirable plants and their roots. Remove contaminated subsoil.
- C. Scarify subsoil to a depth of 3 inches where topsoil is to be placed. Repeat cultivation in areas where equipment, used for hauling and spreading topsoil, has compacted sub-soil.

#### **3.3 PLACING TOPSOIL**

- A. Spread topsoil to a minimum depth of 6 inches over area to be seeded. Rake until smooth.
- B. Place topsoil during dry weather and on dry unfrozen subgrade.
- C. Remove vegetable matter and foreign non-organic material from topsoil while spreading.
- D. Grade topsoil to eliminate rough, low, or soft areas, and to ensure positive drainage.

#### **3.4 FERTILIZING**

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to roller compaction.
- C. Do not apply fertilizer at the same time or with the same machine as will be used to apply seed.
- D. Mix thoroughly into upper 2 inches of topsoil.

- E. Lightly water to aid the dissipation of fertilizer.

### 3.5 SEEDING

- A. Apply seed evenly in two intersecting directions. Rake in lightly.
- B. Do not seed areas in excess of that which can be mulched on the same day.
- C. Planting Season: April to September.
- D. Do not sow immediately following rain, when ground is too dry, or during windy periods.
- E. Roll seeded area with roller not exceeding 112 pounds.
- F. Apply water with a fine spray immediately after each area has been mulched. Saturate to 4 inches of soil.

END OF SECTION

**PART 1 GENERAL**

## 1.1 SUMMARY

- A. This section applies to grout for windows and doors as indicated on drawings and specified herein.

## 1.2 REFERENCES

- A. American Society for Testing and Materials (ASTM) Standard:
  - 1. C827-01 Change in Height at Early Ages of Cylindrical Specimens from Cementitious Mixtures.

## 1.3 SUBMITTALS

- A. Manufacturers' product data sheets and certification that material meets or exceeds requirements outlined in Part 2.

**PART 2 PRODUCTS**

## 2.1 GROUT

- A. Non-ferrous, non-shrink, high-strength, effective at consistencies from extremely fluid to plastic, rust and stain-resistant; conforming to ASTM C827.

**PART 3 EXECUTION**

- 3.1 Provide surface preparation and installation of grout as recommended by the manufacturer.
- 3.2 Fill voids at door frames.
- 3.3 Fill voids at window frames.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Preparation of concrete and application of repair materials.
- B. Rehabilitation of concrete surfaces.

**1.2 REFERENCES**

- A. American Society for Testing and Materials (ASTM) Standards:
  - 1. C109-02 Compressive Strength of Hydraulic Cement Mortars (Using 2-in. Cube specimen).
  - 2. C348-02 Flexural Strength of Hydraulic Cement Mortars.
  - 3. C404-97 Aggregates for Masonry Grout.
  - 4. C496-96 Splitting Tensile Strength of Cylindrical Concrete Specimens.
  - 5. C666-97 Resistance of Concrete to Rapid Freezing and Thawing.
  - 6. C882-99 Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear.

**1.3 SUBMITTALS**

- A. Product data: Indicate product standards, physical and chemical characteristics, technical specifications, limitations, maintenance instructions, and general recommendations regarding each material.
- B. Manufacturer's certificate: Certify that specified products meet or exceed specified requirements.

**1.4 QUALITY ASSURANCE**

- A. Materials manufacturer: Company specializing in manufacturing the products specified in this section.
- B. Applicator: Company specializing in concrete repair and approved by manufacturer.

**1.5 DELIVERY, STORAGE, AND PROTECTION**

- A. Transport, handle, store, and protect products.
- B. Comply with instructions for storage, shelf life limitations, and handling.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

#### A. Manufacturers

1. Sika Corporation, Sika Top 123.
2. STO Concrete Restoration Division, STO. CR702 Overhead Mortar.
3. W. R. Bonsal Company, Bonsal Fast Set Cement Mix with Acrylic.
4. Approved equal.

### 2.2 PATCHING MATERIALS

- A. Polymer-modified structural mortar: Two component with the following minimum characteristics:

<u>Characteristic</u>	<u>Test Method</u>	<u>Results</u>
1. Bond Strength	ASTM C882	3200 psi at 28 days
2. Tensile Strength	ASTM C496	1000 psi at 28 days
3. Flexural Strength	ASTM C348	2000 psi at 28 days
4. Compressive Strength	ASTM C109	7700 psi at 28 days

- B. Sand: ASTM C404; uniformly graded, clean.

- C. Water: Clean and potable.

- D. Aggregate: Clean coarse 3/8-inch in size.

### 2.3 MIXING CEMENTITIOUS MATERIALS

- A. Mix cementitious mortar in accordance with manufacturer's instructions for purpose intended.
- B. Exclude bonding agent as additive to mix.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Verify that surfaces are ready to receive work.
- B. Beginning of installation means acceptance of existing surfaces.

### 3.2 PREPARATION

- A. Remove deteriorated concrete down to firm existing concrete.
- B. Roughen the base concrete to provide mechanical bond and dampen with water.
- C. Clean concrete surfaces of dirt, laitance, corrosion, or other contamination; wire brush using water; rinse surface and allow to dry.
- D. Flush out cracks and voids with water to remove laitance and dirt.

### 3.3 APPLICATION

- A. Mix components in accordance with the manufacturer's requirements.
- B. Repair mortar shall be extended with aggregate when used in voids 1-inch in depth or greater.
- C. After removing all standing water, apply a bond coat to the prepared surface. Thoroughly scrub a thin layer of normal consistency mortar into the saturated surface with a stiff bristle broom or brush. Do not apply more of this bond coat than can be covered with mortar before the bond coat dries.
- D. Do not retemper the bond coat. Immediately place the properly mixed mortar into the prepared area from one side to the other. As the job proceeds, work the material firmly into the bottom and sides of the void to assure good bond. Level the mortar and screed to the elevation of the existing concrete. Broom finish.
- E. Wet cure in accordance with manufacturer's recommendations.

END OF SECTION

**PART 1 GENERAL****1.1 SUMMARY**

- A. This section applies to structural welding in building construction.

**1.2 REGULATORY REQUIREMENTS**

- A. American Institute of Steel Construction (AISC) Standard:
  - 1. 317-84 Manual of Steel Construction, Volume II-Connections.
- B. American Welding Society (AWS), Inc. Standard:
  - 1. D1.1-02 Structural Welding Code - Steel.
  - 1. Z49.1-99 Safety in Welding, Cutting and Allied Processes.

**1.3 SUBMITTALS**

- A. Certification of welders and qualification of weld procedures in accordance with AWS D1.1. Perform no welding before receipt of Contracting Officer's approval of welder certifications and weld procedure qualifications.

**PART 2 PRODUCTS****2.1 MATERIALS**

- A. Equipment, electrodes, welding wire and fluxes: Capable of producing welds in conformance with AWS D1.1 when used by qualified welders and with qualified procedures.

**PART 3 EXECUTION****3.1 INSTALLATION**

- A. Perform welding where indicated on the contract drawings or approved shop drawings and in conformance with provisions of AWS D1.1.
- B. Unless otherwise indicated, conform to AISC 317 for welded connections.
- C. Conform with AWS Z49.1 for safety precautions. Coordinate with the Government representative to obtain a permit from the AEDC Fire Department prior to conducting any open flame cutting or welding.

END OF SECTION



**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Shop fabricated ferrous metal for window bars and miscellaneous steel.

**1.2 REFERENCES**

- A. American Society of Testing and Materials (ASTM) Standards:
  - 1. A36-03 Carbon Structural Steel.
  - 2. A108-99 Steel Bars, Carbon, Cold-Finished, Standard Quality .
  - 3. A307-02 Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength.
  - 4. A501-01 Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- B. American Welding Society, Inc. (AWS) Standard:
  - 1. D1.1-02 Structural Welding Code - Steel.

**PART 2 PRODUCTS****2.1 MATERIALS - STEEL**

- A. Steel sections: ASTM A36.
- B. Steel tubing: ASTM A501.
- C. Steel bars: ASTM A108.
- D. Bolts, nuts, and washers: ASTM A307.
- E. Welding materials: AWS D1.1; type required for materials being welded.

**2.2 FABRICATION**

- A. Fit and shop assemble items in largest practical sections, for delivery to site.
- B. Fabricate items with joints tightly fitted and secured.
- C. Grind exposed joints flush and smooth with adjacent finish surface where indicated on the design or shop drawings. Make exposed joints butt tight, flush, and hairline. Ease exposed edges to small uniform radius.
- D. Supply components required for anchorage of fabrications. Fabricate anchors and related components of same material and finish as fabrication, except where specifically noted otherwise.

## 2.3 FABRICATION TOLERANCES

- A. Maximum misalignment of adjacent members: 1/16 inch.
- B. Maximum bow: 1/8 inch in 48 inches.
- C. Maximum deviation from plane: 1/16 inch in 48 inches.

## 2.4 FINISHES - STEEL

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Paint all structural steel, erection welds, and damaged areas in accordance with Section 09900.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify that field conditions are acceptable and are ready to receive work.

## 3.2 PREPARATION

- A. Clean and strip primed steel items to bare metal where site welding is required.
- B. Supply steel items required to be cast into concrete or embedded in masonry with setting templates to appropriate sections.

## 3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- C. Field weld components indicated on drawings.
- D. Perform field welding in accordance with AWS D1.1.
- E. Obtain approval prior to site cutting or making adjustments not scheduled.
- F. After erection; prime welds, abrasions, and surfaces not shop primed, and paint with paint system specified.

### 3.4 ERECTION TOLERANCES

- A. Maximum variation from plumb: 1/4 inch per story, non-cumulative.
- B. Maximum offset from true alignment: 1/4 inch.
- C. Maximum out-of-position: 1/4 inch.

END OF SECTION

SECTION 06114  
WOOD BLOCKING AND CURBING

**PART 1 GENERAL**

1.1 SUMMARY. Provide treated-wood blocking and cants for roofing system and related metal flashings.

1.2 REFERENCES.

A. American Society for Testing and Materials (ASTM) Standards:

1. E84-03 Surface Burning Characteristics of Building Materials.

B. American Wood Preservers Association (AWPA) Standard:

1. C20-99 Structural Lumber-Fire Retardant Treatment by Pressure Treatment.

C. Southern Pine Inspection Bureau (SPIB) Standard:

1. Grading Rules, 2003.

1.3 QUALITY ASSURANCE.

A. Identify lumber with grade stamp of an agency certified by the Southern Pine Inspection Bureau.

B. Certification concerning preservative treatment to comply with paragraph 2.1D.

**PART 2 PRODUCTS**

2.1 LUMBER. PS 20, Southern Pine, Jack Pine or Red Pine in accordance with ASTM E84. Each piece of lumber shall bear a grade stamp or grade mark showing the association under whose rules it is graded, the grade, the species, and either "S-Dry," "KD," or "MC-15."

A. Thickness less than 2 inches and all widths: SPIB Grading No. 1 boards.

B. Thickness 2 to 4 inches and width 2 to 4 inches: SPIB Grading, structural light framing class, No. 2 grade.

C. Moisture content for lumber 12 percent: Plus or minus 2 percent.

D. Preserved per AWPA C20, except acid copper chromate (ACC) shall not be used. Each piece of preservative-treated lumber shall bear the AWPA quality mark.

2.2 NAILS. Galvanized steel, size and type to suit application.

### **PART 3 EXECUTION**

- 3.1 Remove existing blocking, nailing strips, and cants as indicated and transport to the AEDC construction landfill.
- 3.2 Install blocking, nailing strips, and cants level and plumb in correct position.
- 3.3 Install members true, plumb, level, crown side up, and secured in place.
- 3.4 Construct members of solid wood sections and continuous pieces of longest possible lengths.
- 3.5 Brush two coats of preservative treatment on wood in contact with cementitious materials, roofing, and related metal flashing. Treat site-sawn cuts.
- 3.6 Do not apply flashing or roof materials until the Government representative has reviewed the blocking and cant installations.

END OF SECTION

**PART 1 GENERAL**

1.1 SUMMARY. Provide asphalt bituminous roofing for a 20-year HPR system on the building as indicated on the drawing.

1.2 REFERENCES.

A. American Society for Testing and Materials (ASTM) Specifications:

1. C165-00 Measuring Compressive Properties of Thermal Insulations.
2. C208-01 Cellulosic Fiber Insulating Board.
3. C518-02 Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
4. C728-97 Perlite Thermal Insulation Board.
5. D36-00 Softening Point of Bitumen.
6. D41-00 Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing.
7. D1863-03 Mineral Aggregate Used on Built-Up Roofs.
8. D2178-97 Asphalt Glass Felt Used in Roofing and Waterproofing.
9. D2822-97 Asphalt Roof Cement
10. D2824-02 Aluminum-Pigmented Asphalt Roof Coatings, Non-Fibered, Asbestos Fibered, and Fibered Without Asbestos.
11. D4073-03 Tensile-Tear Strength of Bituminous Roofing Membranes.
12. D4479-00 Asphalt Roof Coatings-Asbestos Free.
13. D5147-02 Sampling and Testing Modified Bituminous Sheet Material.
14. E84-03 Surface Burning Characteristics of Building Materials.

B. Factory Mutual Engineering and Research Corporation (FMERC) Standards.

1. I-28-96 Insulated Steel Decks.
2. I-52-86 Field Uplift Tests.
3. 4470-96 Class 1 Roof Covers.

C. National Fire Protection Association (NFPA) Standard:

1. 241-00 Safeguarding Construction, Alternation, and Demolition Operations.

1.3 SUBMITTALS.

- A. Manufacturer's certification that materials meet or exceed specified requirements. Also submit manufacturer's certification of conformance and catalog data for each type of material proposed for use, to include printed

application instructions and details. Provide all roof components including flashing felts, asphalt, mastic, top ply, and membrane from one manufacturer.

- B. Test reports indicating compliance with the fire hazard requirements of FMERC's Class I roof deck assembly.
  - C. Manufacturer's product data for insulation.
  - D. Twenty-year manufacturer's warranty for the roofing system, ensuring against leakage into the insulation and into the building.
  - E. Statement from the manufacturer that the manufacturer will inspect the project a minimum of twice per week throughout the project duration and will furnish a 20-year warranty to the Government based on installation by the contractor.
  - F. Manufacturer's product data for retrofit roof drain.
- 1.4 WEATHER REQUIREMENTS. Do not apply materials during inclement weather or when air temperature is forecast by the AEDC Operations Center to fall below 40°F. Do not apply materials to damp or frozen surfaces. Protect materials vulnerable to water or sun damage.

## **PART 2 PRODUCTS**

- 2.1 ASPHALT MASTIC: ASTM D4479 (Asphalt mastic modified adhesive) for general roof area. Adhesive must accommodate slopes up to 2:12.
- 2.2 ROOF INSULATION:
  - A. Perlite board: ASTM C728, 35 pounds per square inch (psi) compressive strength by ASTM C165, flame spread value of 25 by ASTM E84, weight of 0.9 pound per square foot per 1-inch thickness, 0.36 thermal conductance value per 1-inch thickness at 75°F by ASTM C518. Provide thickness as indicated on the drawings.
- 2.3 CANTS AND TAPERED EDGE STRIPS: ASTM C208 insulating board (cellulosic fiber), as recommended by the HPR manufacturer for conditions encountered.
- 2.4 GLAZE COATS: The same type of bitumen as specified for application of roofing felts (asphalt mastic for cold process)
- 2.5 ASPHALT GLASS FELT(VAPOR BARRIER): ASTM D2178, Type IV.

2.6 BASE PLY: Modify roofing membrane, asphalt, SBS, rubberized with two-layer fiberglass scrim reinforcement conforming to the following requirements:

- A. Tensile test ASTM D5147: 2.0 in/min.
- B. Tear test ASTM D5147: 2.0 in/min.
- C. Thickness: Not less than 40 mils.
- D. Elongation: ASTM D5147: 3.7 percent machine direction.  
4.0 percent cross machine direction.
- E. Minimum tensile strength, lbs, ASTM D5147 at 0°F:
  - 1. Machine direction: 220 lbf/in.
  - 2. Cross machine: 220 lbf/in.
- F. Minimum tear resistance, lbs ASTM D5147 at 0°F:
  - 1. Machine direction: 295 lbf/in.
  - 2. Cross machine: 220 lbf/in.
- G. Low-temperature flexibility ASTM D5147: -30°F.

2.7 TOP PLY: HPR membrane, asphalt, 16 percent SBS/SIS rubberized with polyester/fiberglass scrim reinforcement, Garland Stress Ply E, or approved equal, black mineral surface conforming to the following requirements:

- A. Tensile test ASTM D5147: 2.0 in/min.
- B. Tear test ASTM D5147: 2.0 in/min.
- C. Thickness: not less than 80 mils.
- D. Rubber content: not less than 16 percent.
- E. Elongation: ASTM D5147: 6.6 percent machine direction.  
5.8 percent cross machine direction.
- F. Softening point ASTM D36: 225°F.
- G. Minimum tensile strength, lbs ASTM D5147 at 0°F:
  - 1. Machine direction: 342 lbf/in.
  - 2. Cross machine: 489 lbf/in.
- H. Minimum tear resistance, lbs ASTM D4073 at 0°F:
  - 1. Machine direction: 603.
  - 2. Cross machine: 722.
- I. Low-temperature flexibility ASTM D5147: -40°F.



- 2.8 ASPHALT-BASED ROOFING CEMENT: ASTM D2822 asphalt roof cement, Type II.
- 2.9 ASPHALT-BASED FLASHING CEMENT: HPR manufacturer's standard.
- 2.10 AGGREGATES FOR SURFACING BUILT-UP ROOFS: ASTM D1863. Aggregates shall be uncrushed, dry, clean, washed commercial grade water-worn gravel consisting of predominantly rounded particles. Aggregate gradation shall conform to Table I below.

<u>Sieve Size</u>	<u>Percent Passing</u>
3/4 inch	100
1/2 inch	85-100
3/8 inch	35-70
No. 4	0-20
No. 8	0-10

Table I. Aggregate gradation.

- 2.11 NAILS AND FASTENERS: Non-ferrous metal or galvanized steel, except that hard copper nails shall be used with copper; aluminum or stainless steel nails shall be used with aluminum; and stainless steel nails shall be used with stainless steel. Fasteners shall be self-clinching or penetrating types treated to prevent corrosion. Felt and roofing nails for wood nailers shall be 11-gauge, barbed, zinc-coated nails with 7/16- to 5/8-inch-diameter heads. Nails shall be long enough to penetrate at least 5/8 inch into the wood nailers.
- 2.12 REINFORCED BASE FLASHING: Asphalt-coated fabric, HPR manufacturer's standard.
- 2.13 ALUMINUM PIGMENTED ROOF COATING: ASTM D2824, reinforced with fibers free of asbestos and lead as recommended by manufacturer.
- 2.14 ASPHALT PRIMER: ASTM D41.
- 2.15 ROOF DRAIN: Retrofit type, 0.064-inch-thick spun aluminum body, cast aluminum strainer dome secured to aluminum clamping ring with three stainless steel screws, 17.5-inch-diameter flashing flange, size as shown on the drawing, U-flow Model No. HD-AL-A, Josam, Jay R. Smith, or approved equal.

### **PART 3 EXECUTION**

- 3.1 Provide a complete roof assembly complying with FMERC 4470 for Class 1A.
- 3.2 Ensure that surfaces are dry, rigid, smooth, and free from cracks, holes, and sharp changes in elevation. All drains, cants, and roof penetrating components

shall be in place. Inspect and approve surfaces immediately prior to application of roofing and flashing. Do not load the deck or any part of the building structure or permit to be loaded with a weight which will cause excessive deflection, compromise safety, or cause damage. Do not store materials and equipment on the roof less than 6 feet from the roof edge unless guardrails are erected at the edge.

### 3.3 COLD PROCESS HPR

- A. Install vapor barrier composed of two-ply of 5-pound asphalt saturated felt over concrete deck primed with asphalt mastic at a rate of 1 gallon per 100 square feet. Mop felts at right angles to the direction of slopes. Lap plies 19 inches and solid mop between piles. Mop felt in 20 to 30 pounds of asphalt mastic per 100 square feet. Turn back two layers of vapor barrier felts 9 inches at parapet walls, eaves, and rakes. Turn back vapor barrier over edges of insulation board at roof penetrations and other locations.
  
- A. Keep all roof insulating materials dry before, during, and after installation. Apply insulation with the long joints continuous and the end joints staggered a minimum of 6 inches. The joints of each succeeding layer of insulation shall be parallel and broken in both directions with respect to the layer below. Apply insulation in the thickness required.
  - 1. Nailers for retaining insulation on decks and for nailing of roofing base sheets are specified in Section 06114.
  - 2. Provide cant strips where indicated and necessary at intersections of the roof with walls, parapets and curbs extending above the roof. The faces of the cant strips shall have an incline of 45 degrees. Cant strips shall bear on the insulation and fit flush against the vertical surfaces. Where possible, nail cant strips to adjoining surfaces. Where installed against non-nailable materials, set in place with asphalt mastic.
  - 3. Where indicated or specified, provide edge strips in the right angle formed by the junction of the roof and wood nailing strips that extend above the level of the roof. Edge strips shall be tapered 1 to 1-1/2 inches in one foot (from the top of the wood nailing strips to 1/8 inch). Fit edge strips flush against the vertical surface of the wood nailing strips. Where possible, nail edge strips to adjoining surfaces. Where installed against non-nailable materials, apply the edge strips in a heavy mopping of bitumen or set in roof cement.
  
- C. Immediately after installation of insulation, apply roofing materials as specified herein unless specified or recommended otherwise by the material manufacturer's printed application instructions.
  - 1. Install HPR membrane solidly bonded with asphalt mastic applied at the rate of approximately 2-1/2 gallons per 100 sf/ply. The roll of HPR membrane must push a puddle of asphalt mastic in front of it with asphalt mastic running out both sides of the sheet. Care should be taken to eliminate air entrapment under the membrane. Install subsequent rolls of HPR membrane across the roof as above with a

minimum of 4-inch side laps and 8-inch end laps. Stagger the end laps. Lay the top HPR membrane in the same direction as the underlayer but do not coincide laps. Complete the application of all plies of roofing, excluding surfacing, in one operation; phased application will not be permitted. When the area to be roofed is such that it cannot be completed in one work day, lay out the areas in segments which can be completely roofed by the end of each work day. Do not accomplish top pouring and surfacing until all other trades have completed their work and the roofing has been inspected for damage, repaired, swept clean and approved by the Government representative. Immediately follow with top surfacing. Apply roof components in compliance with Table II.

<u>Components</u>	<u>Quantity</u>
<u>Base sheets:</u>	
HPR membrane	1 ply
<u>Top ply:</u>	
HPR membrane	1 ply
<u>Asphalt mastic:</u>	
On insulation	2-1/2 gal/100sf/ply
Between top ply and base ply	2-1/2 gal/100sf/ply
Top coat	4 gal/100sf/ply
<u>Surfacing:</u>	
Gravel	450 lbs/100 SF

Table II. Roof component application.

2. Use asphalt mastic for applying base ply. Apply the base ply immediately following the application of the cold mastic. Provide staggered end joints at overlaps. Working ahead with the asphalt mastic is not permitted. Apply asphalt mastic between membrane plies to produce voidless coverage and complete penetration of the bitumen into the base sheets above and below. As base ply is being rolled into the asphalt mastic, immediately and thoroughly broom down to eliminate trapped air and to provide tight, smooth laminations resulting in a composite roofing membrane without wrinkles, buckles, kinks, or fish mouths. The completed roofing system shall be free of voids and blisters.
3. Provide built-up bituminous flashings in the angles formed at walls, curbs, ventilators, pipes and other vertical surfaces, and where required to make the work watertight. Install flashing after all plies of membrane are applied but before the top surfacing is applied.
  - a. Provide two-ply base flashings consisting of one ply of asphalt-saturated fabric over surface primed with asphalt primer

- and embedded in asphalt mastic, and one ply of HPR membrane set in asphalt mastic. Secure top edge with anchor bar system. Seal top edges and vertical seams with 4-inch-wide glass fabric coated with asphalt-based flashing cement. Cement laps. Material and installation shall be in strict accordance with the manufacturer's printed installation instructions.
- b. Set primed flanges of sheet metal work to be incorporated into the roofing system into a uniform coating of asphalt-based roof cement not less than 1/16-inch thick and strip-in with two layers of plying base sheets cemented to the tops of the flanges, roofing membrane, and to each other with coatings of roof cement not less than 1/16-inch thick. Extend the base sheets 3 inches for the bottom ply and 6 inches for the top ply, beyond the edges of the flanges and onto the roofing membrane. Coat the finished strip flashing with asphalt-based roof cement 1/8-inch thick.
  4. Coordinate roof drain flashings with roof drain replacement. Follow manufacturer's installation instructions. All drain locations shall have 48-inch sump created with tapered insulation. Install a 20-inch square 16-ounce copper shield at roof drains. Extend into drain bowls to allow clamping ring to seat over copper shield. Copper shall be laid into a uniform bed of asphalt mastic. Smooth copper to lay flat. Conform to the surface of the new roof system. Flash with two plies of base sheets.
  5. When precipitation is imminent (based on the AEDC Operations Center forecast) and at the end of each day's work, protect applied base sheets as follows:
    - a. Apply water cut-offs consisting of two strips of plying base sheets applied to exposed edges of the insulation. Extend the first strip 5 inches on the roof deck, up the vertical edge of the insulation, and 6 inches on top of the applied base sheets. The second strip shall lap the first strip by 3 inches on each side. Hot-mop the strips to the roof deck, to the applied base sheets and to each other. When the application of the roofing system is resumed, cut the strips of base sheets along the vertical edges of the insulation, exposing the edges of the insulation.
    - b. Provide temporary flashing at drains, curbs, walls, and other penetrations and terminations of roofing base sheets until the roofing membrane is complete, and permanent flashings are applied. Temporary flashings shall consist of one ply of plying base sheets applied in a trowel coat of asphalt-based roofing cement, applied to a primed surface, and finished with a surface coat of asphalt-based roofing cement. Remove temporary flashing before applying permanent flashing.
    - c. Storing, walking, wheeling, and trucking are not permitted directly on applied materials. Provide temporary walkways, runways, and platforms of smooth, clean boards and planks to avoid damage to applied roofing materials and to distribute weight. Use rubber-tired equipment for roofing work.

6. Apply surfacing materials, where indicated in the quantities herein specified, after base sheets flashings, tests, repairs, and corrective action have been completed and witnessed by the Government representative. Uniformly embed aggregate in a flood coat of asphalt mastic. Asphalt mastic shall conform to the specified slope and temperature requirements. Aggregate shall be dry and placed in a manner to form a compact, embedded overlay.
7. Apply aluminum pigmented roof coating to entire exposed surfaces of all base flashings at a minimum rate of 1 gallon per 100 square feet as recommended by the manufacturer.
8. Comply with NFPA 241, section 3-5. Provide 15-pound minimum size fire extinguishers, using ammonium phosphate firefighting agent. On site kettle shall be for temporary roofing.

3.4 Store materials as outlined below.

- A. Deliver all materials to the site, except those in quantity aggregate with packaging intact and with readable labels.
- B. Do not expose materials to moisture in any form before, during, or after delivery to the site.
- C. If possible, store materials in a completely enclosed building or trailer. When out-of-doors, store on clean raised platforms at least 4 inches above the ground.
- D. Remove plastic manufacturer-supplied insulation covers.
- E. Completely cover materials with waterproof canvas tarpaulins to protect from weather and moisture. Arrange covers to prevent condensation from occurring beneath them; do not allow covers to extend onto the ground.

END OF SECTION

SECTION 07600  
FLASHING AND SHEET METAL

**PART 1 GENERAL**

1.1 SUMMARY. Provide flashing and sheet metal for the built-up roofing system shown on the drawings.

1.2 REFERENCES.

A. American Society for Testing and Materials (ASTM) Specifications:

- |    |         |  |
|----|---------|--|
| 1. | A653-03 | Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process. |
| 2. | B370-98 | Copper Sheet and Strip for Building Construction.  |
| 3. | C920-02 | Elastometric Joint Sealant.  |

1.3 SUBMITTALS.

- A. Manufacturer's certification that sheet metal materials meet or exceed specified requirements.
- B. Shop drawings showing exact form, dimensions of flashings, and locations of exposed fasteners.
- C. Manufacturer's product data and color samples for sealant.

**PART 2 PRODUCTS**

- 2.1 ALUMINUM: ASTM A653; minimum 22-gage with coating designation G90, not chemically treated, oiled, or phosphatized.
- 2.2 COPPER: ASTM B370, minimum 16-ounce; cold-rolled temper without lead coating.
- 2.3 FASTENERS: Concealed type, of same material as flashings; sized to suit application.
- 2.4 REGLETS: Recessed galvanized steel.
- 2.5 SOLDER AND FLUX: Type recommended by manufacturer of materials being used.
- 2.6 BITUMINOUS PAINT: Acid- and alkali-resistant type, black color.

- 2.7 SEALANT: Urethane or acrylic polymer, conforming to requirements of ASTM C920; Type II, Class A; non-staining; non-bleeding; non-sagging; of color selected by the Contracting Officer.

### **PART 3 EXECUTION**

- 3.1 Form sections square, true, accurate to size, and free from distortion. Configuration of form and dimensions shall match existing unless noted otherwise. Form sheet metal flashing sections in 10-foot lengths. Provide joint covers for expansion at joints. Fabricate corners, minimum 18 inches by 18 inches, mitered, soldered or welded, and sealed as one piece. Wash and wipe clean soldered joints to remove traces of flux immediately after soldering. Hem exposed edges of flashings on underside 1/2 inch. Back paint flashings with bituminous paint where expected to be in contact with cementitious materials or dissimilar metals.
- 3.2 Install reglets true to line and levels. Seal top of reglets with sealant.
- 3.3 Prime all metal to come in contact with the roof membrane with asphalt primer (see Section 07510).
- 3.4 Install metal flashing with formed metal skirt for cover at pipe penetrations through the roof which are not plumbing vents.
- 3.5 Secure flashings in place using specified fasteners. Use exposed fasteners only after coordination with the Government representative. Exposed fasteners shall be the same finish as flashings.
- 3.6 Insert metal flashings into reglets to form tight fit. Secure in place with wedges at maximum 12 inches on center. Seal flashings into reglet with sealant.
- 3.7 Lock seams and end joints. Fit flashings tight in place. Make corners square and surfaces true and straight in planes.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. The work under this Section shall include furnishing all materials, labor, supervision, and equipment for the installation of joint sealants for doors and windows as specified herein or on the contract drawings.
- B. The provisions of the General Conditions shall apply throughout this section.
- C. In case of any conflict between this section, notes on the construction documents and other sections or building codes, the most rigid requirements shall govern.

**1.2 SUBMITTALS**

- A. Product data and samples.
- B. Manufacturer's surface preparation and installation instructions.

**1.3 CODES AND STANDARDS**

- A. American Society for Testing and Materials (ASTM) Standard:
  - 1. C920-02 Elastomeric Joint Sealants.

**1.4 WARRANTY**

- A. Furnish five year warranty to include replacement of sealants that fail because of loss of cohesion or adhesion, or do not cure.

**1.4 QUALIFICATIONS**

- A. Installer: Company specializing in performing this work.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Deliver materials in original unopened packages with manufacturer's labels, instructions, and product identification and numbers intact and legible.
- B. Store materials protected from the weather, in original containers or unopened packages, in accordance with manufacturer's instructions.



## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. GE Silicones.
- B. Dow Corning.
- C. Approved equal.

### **2.2 SEALANTS**

- A. Typical sealant: Silicone ASTM C920, Type S, Grade: NS, Class: 25.
- B. Sealants shall be selected for appropriate applications as recommended by the manufacturer or as indicated on the drawings.

### **2.3 ACCESSORIES**

- A. Primer: Manufacturer's standard.
- B. Joint cleaner: Manufacturer's standard.
- C. Backer rod: Open cell polyurethane or closed cell polyethylene foam, compatible with sealant, sized and shaped to provide proper compression upon insertion in accordance with manufacturer's recommendations.
- D. Bond breaker: Pressure sensitive adhesive polyethylene Teflon or polyurethane foam tape.
- E. Masking tape: Pressure sensitive adhesive paper tape.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Verify that surfaces or joint openings are free of defects, are in the specified dimensions, including tolerances, and are ready to receive the work.

### **3.2 PREPARATION**

- A. Cleaning: Clean joint surfaces, using joint cleaner as necessary, to remove dust, dirt, oil, grease, rust, lacquers, laitance, release agents, moisture, frost, or other matter that might adversely affect adhesion of sealant.
- B. Masking: Mask areas adjacent to joints.

- C. If required, prime substrate surfaces following manufacturer's instructions.
- D. Mixing: When required, mix components of sealant materials in accordance with manufacturer's instructions to achieve required characteristics of sealant.

### 3.3 INSTALLATION

- A. Install backing material in joints using blunt instrument to avoid puncturing. Do not twist the backing rod while installing. Install backing rod so that joint depth is 50 percent of joint width, but a minimum of 1/8-inch deep and a maximum of 3/8-inch deep.
- B. Apply sealant in joints using a pressure gun with nozzle cut to fit joint width. Ensure sealant is deposited in a uniform, continuous bead without gaps or air pockets.
- C. Tool joints to required configuration within 10 minutes of sealant application. Remove masking materials immediately after tooling.

### 3.4 CLEANING

- A. Remove all excess materials adjacent to joints by mechanical means or mask to prevent evidence of spillage or damage to adjacent surfaces.
- B. Leave finished work in neat, clean condition with no evidence of spillovers onto adjacent surfaces.
- C. When using flammable solvents, avoid heat, sparks, and open flames. Provide necessary ventilation. Follow all precautions and safe handling recommendations from the solvent manufacturer and pertinent local, state, and federal regulations.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Non-rated steel security doors.

**1.2 RELATED SECTIONS:**

- A. Section 08112 – Custom Steel Frames.
- B. Section 08800 – Glass and Glazing.
- B. Section 09900 – Painting.

**1.3 REFERENCES**

- A. American Society for Testing and Materials (ASTM) Standard:
  - 1. A653-03 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- B. Hollow Metal Manufacturers Association (HMMA) Standards:
  - 1. 802-92 Manufacturing of Hollow Metal Doors and Frames.
  - 2. 810-87 Hollow Metal Doors.
  - 3. 830-87 Hardware Preparation and Locations for Hollow Metal Doors and Frames.
  - 4. 840-99 Installation and Storage of Hollow Metal Doors and Frames.
  - 5. 863-98 Detention Security Hollow Metal Doors and Frames.
  - 6. 890-00 Technical Summary of Hollow Metal by HMMA.

**1.4 SUBMITTALS**

- A. Shop drawings.
- B. Product data showing door configuration.
- C. Manufacturer's certification of door materials.

**1.5 QUALITY ASSURANCE**

- A. Conform to HMMA 890, HMMA 802, HMMA 810, HMMA 830, HMMA 840, and HMMA 863.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept doors on site in manufacturer's packaging. Inspect for damage.
- B. Break seal on-site to permit ventilation.

## 1.8 COORDINATION

- A. Coordinate the work with door opening construction, doorframe, and door hardware installation.

# **PART 2 PRODUCTS**

## 2.1 MANUFACTURERS – DOOR

- A. Ceco Door Products Restrict Dor.
- B. Amweld Building Products.
- C. Curries Company.
- D. General Products Co. (Benchmark).
- E. Approved equal.

## 2.2 MATERIALS – DOOR

- A. Exterior security doors (non-rated): Heavy-duty, 1-3/4-inch thickness, full flush, steel stiffeners, HMMA 863, Design F.

## 2.3 DOOR CONSTRUCTION

- A. Face: Steel galvanized sheet in accordance with ASTM A653, HMMA 802, and HMMA 810.
- B. Core: Vertical steel stiffeners, 4 inches on centers, and 14 gauge.
- C. Door edge design: Recessed, 12 gauge steel channel.
- D. Special features: Hinge side protection (dowel-pin and socket or lug and receptacle), 7 gauge anti-pry strips with 1-inch frame overlap.

## 2.4 ACCESSORIES

- A. Primer: Rust-inhibiting type.

## 2.5 FABRICATION

- A. Fabricate doors with hardware reinforcement welded in place.
- B. Configure exterior doors to receive recessed weather stripping.

## 2.6 FINISH

- A. Primer: Baked.

# **PART 3 EXECUTION**

## 3.1 EXAMINATION

- A. Verify that opening sizes and tolerances are acceptable.

## 3.2 INSTALLATION

- A. Install doors in accordance with HMMA 840 and HMMA 830 for hardware installation.
- B. Coordinate installation of doors with installation of frames specified in Section 08112.
- C. Coordinate installation of glass and glazing.

## 3.3 ERECTION TOLERANCES

- A. Maximum diagonal distortion: 1/16 inch measured with straight edge, corner to corner.

## 3.4 Adjust door for smooth and balanced door movement.

## 3.5 Refer to door and frame schedule as indicated.

## 3.6 Paint doors in compliance with Section 09900. Color: Bronze.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Non-rated frames.

**1.2 RELATED SECTIONS:**

- A. Section 08111 – Custom Steel Doors.
- B. Section 09900 – Painting.

**1.3 REFERENCES**

- A. American Society for Testing and Materials (ASTM) Standard:
  - 1. A653-03 Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.
  - 2. C920-02 Elastomeric Joint Sealants.
- B. Hollow Metal Manufacturers Association (HMMA) Standards:
  - 1. 802-92 Manufacturing of Hollow Metal Doors and Frames.
  - 2. 820-87 Hollow Metal Frames.
  - 3. 830-87 Hardware Preparation and Locations for Hollow Metal Doors and Frames.
  - 4. 840-99 Installation and Storage of Hollow Metal Doors and Frames.
  - 5. 850-00 Fire Rated Hollow Metal Doors & Frames
  - 6. 863-98 Detention Security Hollow Metal Doors and Frames.
  - 7. 890-00 Technical Summary of Hollow Metal by HMMA.

**1.4 SUBMITTALS**

- A. Shop drawings.
- B. Product data showing frame configuration and finishes.
- C. Manufacturer's Certification of frame materials.

**1.5 QUALITY ASSURANCE**

- A. Conform to requirements of HMMA 890, HMMA 802, HMMA 820, HMMA 830, HMMA 840, HMMA 850, and HMMA 863.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Accept frames on site in manufacturer's packaging. Inspect for damage.

## 1.8 COORDINATION

- A. Coordinate the work with frame opening construction and door hardware installation.

# **PART 2 PRODUCTS**

## 2.1 MANUFACTURERS – FRAME

- A. Ceco Door Products.
- B. Amweld Building Products Corp.
- C. Curries Company.
- D. General Products Co. (Benchmark).
- E. Approved equal.

## 2.2 MATERIALS – FRAME

- A. Frames: Shop fabricatd steel frames, 10 gauge in accordance with model of door specified in Section 08111. Provide frames with hinge side protection (dowel-pin and socket or lug and receptacle) and punched and countersunk for expansion bolt anchors.

## 2.3 ACCESSORIES

- A. Sealant: FS TT-S-00230C. Backer rod shall be compatible with sealant.
- B. Weatherstripping: Resilient rubber set in steel container.
- C. Removable stops.

## 2.4 FABRICATION

- A. Fabricate frames for knock down field assembly.

- B. Fabricate frames to HMMA 802 and 820 with hardware reinforcement plates welded in place.
- C. Prepare frame for silencers. Provide three single silencers for single doors on strike side.
- D. Removable mullions for double doors.

## 2.5 FINISH

- A. Steel sheet: Galvanized to ASTM A653.
- B. Primer: Baked.

## **PART 3 EXECUTION**

### 3.1 EXAMINATION

- A. Verify that opening sizes and tolerances are within acceptable limits.

### 3.2 INSTALLATION

- A. Install frames in accordance with HMMA 830 and 840.
- B. Coordinate with existing wall construction for anchor placement.
- C. Coordinate installation of frames with installation of doors in Section 08111.
- D. Grout-fill frame with a pourable type grout with 3000 psi compressive strength. Comply with Section 03600.

### 3.3 ERECTION TOLERANCES

- A. Maximum diagonal distortion: 1/16 inch measured with straight edge, corner to corner.

### 3.4 PAINT:

- A. Paint frames in compliance with Section 09900. Color Bronze.

END OF SECTION



**PART 1 GENERAL****1.1 WORK INCLUDED**

- A. Furnish all labor and materials to complete the fabrication of exterior steel windows as shown on drawings and as specified herein. All windows must be domestically manufactured in the U.S.A. All work shall include, but not be limited to, the following:
  - 1. Steel fixed windows.
  - 2. All window anchors, mullions, covers, and trim.
  - 3. Factory applied finish.
  - 4. Installation.
- B. Options:
  - 1. Option I: Provide steel windows for 1/4-inch-thick single pane standard glass.
  - 2. Option II: Provide steel windows for 1-1/4-inch-thick laminated polycarbonate.
- C. Related work specified elsewhere:
  - 1. Glass, glazing and glazing materials, Section 08800
  - 2. Perimeter caulking, Section 07900
  - 3. Miscellaneous structural items, Section 05500.

**1.2 CODES AND STANDARDS**

- A. American Society for Testing and Materials (ASTM) Standards:
  - 1. B633-98 Electrodeposited Coatings of Zinc on Iron and Steel.
  - 2. E283-99 Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specific Pressure Differences Across the Specimen.
  - 3. E330-02 Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference.
  - 4. E331-00 Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- B. Glass Association of North America (FGMA) Standard:
  - 1. Glazing Manual, 1997.

### 1.3 QUALITY ASSURANCE

- A. Manufacturer shall have not less than 5 years experience in the fabrication of heavy intermediate steel windows.
- B. Installation of windows shall be done by experienced window installers.
- C. Allowable tolerances: Size dimensions + 1/16 inch.
- D. Source quality control:
  - 1. Air infiltration test:
    - a. ASTM E283.
    - b. Maximum air infiltration 0.37 CFM/Ft. of crack length.
  - 2. Water penetration test:
    - a. ASTM E331.
    - b. No water penetration for 15 minutes when window is subjected to a rate of flow of 5 gal/hr/sq. ft. with differential pressure across window unit of 6.24 PSF (50 mph.).
  - 3. Structural test:
    - a. ASTM E330.
    - b. No damage at 60 psf.
  - 4. Upon request, the window manufacturer shall provide a test report from a qualified independent U.S. testing laboratory regularly engaged in testing windows to verify conformation to these test requirements.

### 1.4 SUBMITTALS

- A. Samples:
  - 1. Typical window corner with glazing beads.
  - 2. Sample of specified muntin, showing welded intersections and glazing beads.
  - 3. Color sample of finish.
- B. Shop drawings and manufacturer's literature:
  - 1. Shop drawings for approval showing window and installation details, including anchorage, fastening, and recommended sealing methods.
  - 2. Dimensioned elevations showing window opening and window sizes.
  - 3. The manufacturer shall not commence any work until shop drawings have been approved.
  - 4. Color charts for standard finishes and sealants.

### 1.5 PRODUCT, STORAGE AND HANDLING

- A. Protect and store the windows after delivery to the site.

- B. Store in designated areas in an upright position on wood slats or on a dry floor in a manner that will prevent damage. Ventilate canvas or plastic coverings to prevent humidity buildup.

## **PART 2 PRODUCT**

### **2.1 MATERIALS**

- A. Heavy weather stripped windows shall be manufactured from solid hot rolled steel shapes.
  - 1. Sections made from new billet steel with flanges rolled integrally at the mill.
  - 2. Perimeter frames shall have glazing rebates providing an unobstructed glazing surface of at least 3/4 inch in height to comply with the GANA (Glass Association of North America) requirement for 1/2-foot glass bite for insulating glass.
  - 3. Glazing rebate surfaces must be perpendicular to the web or stem of the section. Applied glazing rebate extensions and rebate surfaces that are tapered will not be acceptable.
  - 4. Combined weight of frame and ventilator sections shall be a minimum of 3.7 pounds per lineal foot. Frame section alone shall not weigh less than 1.65 pounds per lineal foot.
- B. Muntins:
  - 1. Steel tee muntins:
    - a. Muntins shall be solid hot rolled from new billet steel with flanges rolled integral at the mill.
    - b. Glazing rebate surfaces must be perpendicular to the stem of this section. Rebate surfaces that are tapered will not be acceptable.
    - c. 1-3/4 inch tee shall weigh 1.371 pounds per lineal foot, the 1-3/8-inch tee shall weigh 1.230 pounds per lineal foot, and the 7/8-inch tee shall weigh 1.094 pounds per lineal foot (specify).
- C. Glazing beads shall be extruded aluminum alloy 6063-15 with a minimum thickness of 0.062 inches.
- D. Weather stripping shall be extruded vinyl.
- E. All screws, for hardware, trim, covers, anchoring, weather bars, water dams, etc. shall be non-ferrous brass or stainless steel. Glazing bead retainer screws are plated steel.
- F. Paint:
  - 1. Galvanizing.
  - 2. Pretreatment - zinc phosphate treated.
  - 3. Primer - standard dip primer.

4. Finish coat - standard finish.

## 2.2 FABRICATION

- A. Fabricate steel windows in accordance with approved shop drawings.
- B. Prior to fabrication, all hot rolled steel sections shall be cleaned by shot blasting.
- C. Corners of frame shall be mitered or coped then solidly welded. Exposed and contact surfaces shall be finished smooth flush with the adjacent surfaces. All interior and exterior rail bar and muntin joints shall be face welded and ground smooth.
- D. Muntins:
  1. Steel tee muntins shall be tenoned and welded to the perimeter frame. Muntin intersections shall be slotted, cross notched and welded. All interior and exterior muntin joints shall be face welded and ground smooth.
- E. Glazing:
  1. All windows shall be designed for inside glazing.
  2. Provide replaceable continuous snap-in glazing beads to suit the glass as specified.
  3. Glazing beads shall be cut and shop fitted to each glass lite prior to shipment.
- F. Weatherstrip:
  1. Continuous vinyl weather stripping shall be applied to the integral weather strip grooves in the interior and exterior contact surfaces of the sections. Weather stripping that is surface applied or requires an additional retainer or requires screws for application shall not be acceptable.
- G. Factory finishing:
  1. Shot blasting:
    - a. Before any machining or welding is performed, all hot-rolled steel sections shall be cleaned by shot blasting to remove any loose scale.
  2. Galvanizing:
    - a. After fabrication, but prior to final assembly, hot-rolled steel windows and mullions shall be thoroughly cleaned, pickled and fluxed.
    - b. All material shall then have an electro-deposited zinc coating.
    - c. The thickness of the resultant coating shall conform to ASTM B633 Type 1, Class 3.

3. Bonderizing:
  - a. After fabrication, windows, mullions, covers, and trim shall be given a bonderized treatment that produces a non-metallic phosphate coating on the surface of the steel integral with the metal itself.
  - b. The following five-stage process produces a coating of innumerable crystals, which provide microscopic pores into which the primer will penetrate and become firmly bonded to the metal.
    - 1) Pressure sprayed for three minutes with a hot alkaline solution at a temperature of 110°F. to remove all shop dirt, grease and oil.
    - 2) Pressure sprayed for three minutes with clear water at a temperature of 110°F. to remove the alkaline solution.
    - 3) Immersed in a zinc phosphate solution of Bonderite 37 or equivalent for six minutes.
    - 4) Rinsed for three minutes with clear water at a temperature of 110°F. to remove excessive Bonderite salts.
    - 5) Immersed in a non-chrome post treatment solution of Paracolene 85 or equivalent for three minutes to enhance the paint base and seal the coating.
    - 6) Air-dried and cooled in preparation for prime painting.
4. Prime painting:
  - a. Following the pretreatment, windows and accessories are then dip primed with a PPG acrylic epoxy primer to insure all surfaces are covered.
  - b. The primer is oven baked at 300°F. for 15 minutes to a dry film thickness of 1.5 mils.
  - c. The material is then cooled in preparation for the finish coat.
5. Ultrathane finish painting:
  - a. Following the prime coat, all windows and accessories are given a spray coat of Tnemec acrylic polyurethane and oven baked at 225°F. for 15 minutes to a dry film thickness of 1.5 mils.
  - b. The combined overall dry film thickness of the prime coat and finish coat applied to the windows shall be 3.0 mils.
  - c. Color to be selected.

### **PART 3 EXECUTION**

#### **3.1 INSPECTION**

- A Window openings shall conform with details, dimensions and tolerances shown on the window manufacturer's approved shop drawings.
- B. Conditions which may adversely affect the window installation must be corrected before installation commences.
- C. The wash down of the adjacent areas must be completed before erection commences to prevent damage to the finish by the cleaning materials.

### 3.2 INSTALLATION

- A Windows specified under this section shall be installed by experienced personnel.
- B. Install windows in openings in strict accordance with approved shop drawings.
  - 1. Set units plumb, level and true to line, without warp or rack of frames.
  - 2. Anchor units securely to surrounding construction with approved fasteners.
  - 3. The exterior joints between the windows, trim and mullions shall be properly sealed watertight with an approved sealant and neatly pointed.
- C. Repair any abraded areas of the factory finish.
- D. Leave window surfaces clean after installation and ready to receive glass and glazing.

END OF SECTION

**PART 1 GENERAL****1.1 SUMMARY**

- A. Section includes hardware for steel doors.
  - 1. Provide door gaskets, including weatherstripping and seals, and thresholds.

**1.2 REFERENCES**

- A. Builders Hardware Manufacturers Association (BHMA) Standard:
  - 1. A156.1-00 Butts and Hinges.
  - 2. A156.2-96 Bored and Preassembled Locks and Latches.
  - 3. A156.3-01 Exit Devices.
  - 4. A156.4-00 Door Controls – Closers.
  - 5. A156.5-01 Auxiliary Locks and Associated Products.
  - 6. A156.6-01 Architectural Door Trim.
  - 7. A156.8-00 Door Controls – Overhead Stops and Holders.
  - 8. A156.15-01 Release Devices-Closer Holder Electromagnetic and Electromechanical.
  - 9. A156.16-02 Auxiliary Hardware.
  - 10. A156.18-00 Materials and Finishes.
- B. National Fire Protection Association (NFPA) Standards:
  - 1. 80-99 Fire Doors and Fire Windows.
  - 2. 252-03 Fire Tests of Door Assemblies.
- C. Underwriters Laboratories, Inc (UL) Standards:
  - 1. Building Materials Directory, 2003.
  - 2. 305-01 Panic Hardware.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Hardware: Tested in accordance with NFPA 252.

**1.4 SUBMITTALS**

- A. Shop drawings: Indicate locations and mounting heights of each type of hardware, schedules, catalog cuts, electrical characteristics and connection requirements.
- B. Manufacturer's parts lists and templates.
- C. Samples: One sample of typical hinge, latchset, lockset, and closer illustrating style, color, and finish. Samples will be returned to supplier.

- D. Manufacturer's Installation Instructions: Special procedures, and perimeter conditions requiring special attention.
- E. Project record documents: Record actual locations of installed cylinders and their master key code.
- F. Operation and maintenance data: Data on operating hardware, lubrication requirements, and inspection procedures related to preventative maintenance.
- G. Keys: Deliver with identifying tags to the Government representative by security shipment direct from hardware supplier.

## 1.5 QUALITY ASSURANCE

- A. Perform work in accordance with the following requirements:
  - 1. BHMA A156 series.
  - 2. NFPA 80.
  - 3. UL 305.
- B. Maintain one copy of each document on site.

## 1.6 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing products specified in this section.
- B. Hardware supplier: Company specializing in supplying commercial/institutional door hardware.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Package hardware items individually with necessary fasteners, instructions, and installation templates, when necessary; label and identify each package with door opening code to match hardware schedule.

## 1.8 COORDINATION

- A. Coordinate work with other directly affected sections involving manufacture or fabrication of internal reinforcement for door hardware and recessed items.
  - 1. Provide templates or actual hardware as required to ensure proper preparation of doors and frames.
- B. Sequence installation to accommodate required utility connections.
- C. Coordinate the Government's keying requirements during course of work.



## 1.9 WARRANTY

- A. Furnish five-year manufacturer warranty for locksets and door closers.

## 1.10 MAINTENANCE MATERIALS

- A. Furnish special wrenches and tools applicable for each different and for each special hardware component.
- B. Furnish maintenance tools and accessories supplied by hardware component manufacturer.

## 1.11 EXTRA MATERIALS

- A. Furnish ten extra key lock cylinders for each master keyed group.

# **PART 2 PRODUCTS**

## 2.1 MANUFACTURERS

- A. Lock set:
  - 1. Lloyd Matheson, Inc. (Lockwood).
  - 2. Approved equal.
- B. Latch sets:
  - 1. Russwin Hardware.
  - 2. Schlage Locks.
  - 3. Sargent Hardware.
  - 4. Approved equal.
- C. Hinges:
  - 1. Hager.
  - 2. Bommer.
  - 3. Stanley.
  - 4. Approved equal.
- D. Exit Devices:
  - 1. Adams Rite.
  - 2. Sargent and Greenleaf, Inc.
  - 3. Von Duprin.
  - 4. Approved equal.
- E. Closers:
  - 1. LCN Closers.
  - 2. Norton Door Controls.
  - 3. Approved equal.

- F. Thresholds:
  1. National Guard Products.
  2. Pemko.
  3. Zero.
  4. Approved equal.
- G. Weather stripping and Sound proofing.
  1. National Guard Products.
  2. Pemko.
  3. Zero.
  4. Approved equal.

## 2.2 COMPONENTS

- A. General hardware requirements: Where not specifically indicated, comply with applicable BHMA A156 standard for type of hardware required. Furnish each type of hardware with accessories as required for applications indicated and for complete, finished, operational doors.
  1. Templates: Furnish templates or physical hardware items to door and frame manufacturers sufficiently in advance to avoid delay in work.
  2. Reinforcing units: Furnished by door and frame manufacturers; coordinated by hardware supplier or hardware manufacturer.
  3. Fasteners: Furnish as recommended by hardware manufacturer and as required to secure hardware.
  4. Finish: Match hardware item being fastened.
  5. Fire ratings: Provide hardware with UL or Warnock Hersey listings for type of application involved.
- B. Hinges: BHMA A156.1, full mortise type , template type, complying with following general requirements unless otherwise scheduled.
  1. Widths: Sufficient to clear trim projection when door swings 180 degrees.
  2. Number: Furnish minimum three hinges to 90 inches high, four hinges to 120 inches high for door leaf.
  3. Fire rated doors to 86 inches high: Minimum three hinges.
  4. Pins: Furnish nonferrous hinges with non-removable pins (NRP) at exterior and locked out-swinging doors, non-rising pins at interior doors.
  5. Tips: Flat button tips with matching plug.
- C. Pivots: BHMA A156.1 and A156.4, center pivots.
  1. Size: As recommended by pivot manufacturer for size and weight of door.
- D. Locksets: Furnish locksets compatible with specified cylinders. Typical 2 3/4 inches backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
  1. Bored (cylindrical) locksets: BHMA A156.2, Series 4000, Grade 1 unless otherwise indicated.

- E. Latch sets: Match locksets. Typical 2 3/4 inches backset. Furnish standard strikes with extended lips to protect trim from being marred by latch bolt verify type of cutouts provided in metal frames.
  - 1. Bored (cylindrical) latch sets: BHMA A156.2, Series 4000, Grade 2 unless otherwise indicated.
- F. Cylinders: BHMA A156.5, Grade 1, 6 pin type interchangeable core type cylinders. Match existing building cylinders.
  - 1. Keying: Key to existing keying system.
- G. Closers: BHMA A156.4 modern type with cover surface mounted closers; full rack and pinion type with steel spring and non-freezing hydraulic fluid; closers required for fire rated doors unless otherwise indicated.
  - 1. Adjustability: Furnish controls for regulating closing, latching, speeds, and back checking.
  - 2. Arms: Type to suit individual condition; parallel-arm closers at reverse bevel doors and where doors swing full 180 degrees.
  - 3. Location: Mount closers on inside of exterior doors, room side of interior doors typical; mount on pull side of other doors.
  - 4. Operating pressure: Maximum operating pressure as follows.
    - a. Exterior doors: Maximum 10 pounds.
    - b. Fire rated doors: As required for fire rating, maximum 15 pounds.
- H. Door controls and overhead holders: Furnish with accessories as required for complete operational installation.
  - 1. Manual door holders and overhead stops: BHMA A156.8, Grade 1 types as specified.
  - 2. Closer holder release devices: BHMA A156.15 door mounted closers with single point hold open.
- I. Push/pulls, manual bolts, protection plates, gasketing, thresholds, and trim: Furnish as indicated in schedule, with accessories as required for complete operational door installations.
  - 1. Push/pulls: BHMA A156.6; push plates minimum 0.050-inch thick. Furnish straight, offset push-pull plate type pulls with bolts to secure from opposite door face; furnish with minimum 0.050 inch pull plates unless otherwise indicated.
  - 2. Manual bolts: BHMA A156.16 Grade 1 top and bottom flush bolts, with dust-proof floor strike, unless otherwise indicated.
  - 3. Kickplates mop plate: BHMA A156.6, metal; 12 inches high by 1 inch less than door width; minimum 0.125-inch thick, clear acrylic plastic.
  - 4. Weather-stripping: Furnish continuous weather-stripping at top and sides of exterior doors.
  - 5. Thresholds: Maximum 1/2-inch high.
  - 6. Floor stops: BHMA A156.1 Grade 1 standard floor type with no visible screws; furnish with accessories as required for applications indicated.

## 2.3 ACCESSORIES

- A. Lock trim: Furnish levers with rose plate as selected from manufacturer's full range of levers and roses.

## 2.4 FINISHING

- A. Finishes: BHMA A156.18; furnish following finishes except where otherwise indicated in schedule at end of section.
  - 1. Hinges: 626 satin finish.
  - 2. Typical exterior exposed and high use interior door hardware: 626 satin chromium plated brass or bronze.
  - 3. Closers: Finish appearance to match door hardware on same face of door. 626 satin aluminum, clear anodized.
  - 4. Thresholds: Finish appearance to match door hardware on exterior face of door. 628 satin aluminum, clear anodized.
  - 5. Other Items: Furnish manufacturer's standard finishes to match similar hardware types on same door, and maintain acceptable finish considering anticipated use and BHMA category of finish.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Verify doors and frames are ready to receive door hardware and dimensions are as indicated on shop drawings.

## 3.2 INSTALLATION

- A. Coordinate mounting heights with door and frame manufacturers. Use templates provided by hardware item manufacturer.
- B. Mounting heights from finished floor to center line of hardware item: Comply with manufacturer recommendations and applicable codes where not otherwise indicated.
  - 1. Locksets: 38 inches.
  - 2. Push/pulls: 42 inches.
  - 3. Dead locks: 48 inches.
  - 4. Push pad type exit devices: 42 inches.
  - 5. Cross bar type exit devices: 38 inches.
  - 6. Top hinge: Jamb manufacturer's standard, but not greater than 10 inches from head of frame to center line of hinge.
  - 7. Bottom hinge: Jamb manufacturer's standard, but not greater than 12 1/2 inches from floor to center line of hinge.
  - 8. Intermediate hinges: Equally spaced between top and bottom hinges and from each other.
  - 9. Hinge mortise on door leaf: 1/4 inch to 5/16 inch from stop side of door.

### 3.3 FIELD QUALITY CONTROL

- A. Supplier inspects installation and certifies hardware and installation has been furnished and installed in accordance with manufacturer's instructions and as specified.

### 3.4 ADJUSTING

- A. Adjust hardware for smooth operation.

### 3.5 PROTECTION OF INSTALLED CONSTRUCTION

- A. Do not permit adjacent work to damage hardware or hardware finish.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Glass inserts for building exterior steel windows. (Options I and II).
- B. Perimeter sealant.

**1.2 CODES AND STANDARDS**

- A. American Society for Testing and Materials (ASTM) Standard:
  - 1. C1036-01 Flat Glass.
  - 2. C1349-96 Architectural Flat Glass Clad Polycarbonate.
  - 3. D2000-01 Rubber Products in Automotive Applications.
- B. Glass Association of North America (FGMA) Standard:
  - 1. Glazing Manual, 1997.

**1.3 SUBMITTALS**

- A. Manufacturer's product data and installation instructions for glazing and glazing components.

**PART 2 PRODUCTS****2.1 MANUFACTURERS**

- A. PPG Industries, Inc.
- B. Libbey-Owens-Ford Co.
- C. Ford Glass Division.
- D. Approved equal.

**2.2 MATERIALS**

- A. Glass types:
  - 1. Non-insulated 1/4-inch thick, Type I annealed flat type, class 1 clear, ASTM C1036 for exterior steel windows (Option I).
  - 2. Laminated polycarbonate, ASTM C1349, 1-1/4-inch thick (Option II).

- B. Molded neoprene glazing gaskets: Molded or extruded neoprene gaskets of the profile and type required for airtight construction; complying with ASTM D2000 designation 2 BC 415 to 3 BC 620, black.
- C. Setting blocks: Neoprene or ethylene propylene diene monomer (EPDM) 70-90 durometer hardness, with proven compatibility with sealant used.
- D. Spacers: Neoprene or EPDM, 40-50 durometer hardness, with proven compatibility with sealant used.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION**

- A. Make all glass product installations airtight. Each installation shall withstand normal temperature changes and impact loading without failure, including loss or breakage of glass, failure of sealants or gaskets, deterioration of glazing materials, or other defects in the work.
- B. Protect glass from edge damage during handling and installation and subsequent operation of glazed components of the work. Discard units with significant edge damage or other imperfections.
- C. Comply with combined recommendations of manufacturers of glass and glazing products, FGMA Glazing Manuals, for uniformity of pattern, draw, bow, and similar characteristics.
- D. Comply with manufacturer's recommendations in providing voids in jamb and head channels or use of filler rods to prevent exudation of sealants or compounds. Do not use filler rods or leave voids in sill channels.
- E. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.
- F. Remove and replace glass which is broken, chipped, cracked, abraded, or damaged in other ways during construction, including natural causes, accidents, or vandalism. Clean and polish both faces of glass within four days of date of scheduled completion. Follow manufacturer's recommendations for final cleaning.

END OF SECTION

**PART 1 GENERAL****1.1 SECTION INCLUDES**

- A. Surface preparation and field application of paints and coatings.

**1.2 CODES AND STANDARDS**

- A. American Society for Testing and Materials (ASTM) Standard:
  - 1. D16-01 Standard Terminology for Paint Related Coatings, Materials, and Applications.

**1.3 QUALITY ASSURANCE**

- A. All surface preparation work shall meet Structural Steel Painting Council guidelines. Apply primer in the shop the same day as cleaning.
- B. Whenever possible, the coating product shall be a low VOC content (<3.5 lbs solvent/gallon), with coating container bearing low VOC label. Products containing Class I Ozone Depleting Chemicals shall not be used.
- C. Prepare 12 inches by 12 inches sample of finishes when requested by the Government representative. When possible, apply finishes on identical type materials to which they will be applied on job. Identify each sample as to finish, formula, color name and number and sheen name and gloss units.
- D. Inspect, clean, and touch-up all exposed bolt heads, surfaces left unpainted, and any exposed areas where the shop coat of primer has been damaged.
- E. All coating products shall be new and of high industrial quality, and free of defects.
- F. Conform to ASTM D16 for this section.
- G. Conform to ASTM D16 for interpretation of terms used in this section.

**1.4 SUBMITTALS**

- A. Product data: Furnish data on all finishing products.
- B. Samples: Submit two color chip samples, 2 inches by 2 inches in size for each color indicated on the drawings.



## 1.5 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the products specified in this section.
- B. Applicator: Company specializing in performing the work of this section.

## 1.6 REGULATORY REQUIREMENTS

- A. Conform to Class A flame and smoke rating requirements for finishes.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site in sealed and labeled containers; inspect to verify acceptability.
- B. Container label to include manufacturer's name, type of paint, brand name, lot number, brand code, coverage, surface preparation, drying time, cleanup requirements, color designation, and instructions for mixing and reducing.
- C. Store paint materials at minimum ambient temperature of 45°F and a maximum of 90°F, in ventilated area, and as required by manufacturer's instructions.

## 1.8 ENVIRONMENTAL REQUIREMENTS

- A. Do not apply materials when surface and ambient temperatures are outside the temperature ranges required by the paint product manufacturer.
- B. Minimum application temperatures for latex paints: 45°F for interiors, unless required otherwise by manufacturer's instructions.
- C. Provide lighting level of 80 ft candles measured mid-height at substrate surface.

# **PART 2 PRODUCTS**

## 2.1 MANUFACTURERS

- A. Manufacturers - Paint
  - 1. Sherwin Williams Co.
  - 2. Porter Paints.
  - 3. PPG Industries.
  - 4. Approved equal.

## B. Materials

1. Paint: Porter DTM Semi-gloss acrylic paint.
2. Primer: Porter DTM Semi-gloss acrylic primer.

## 2.2 MATERIALS

- A. Containers shall be tightly sealed and clearly labeled for identification.
- B. Coatings: Ready mixed, except field-catalyzed coatings. Process pigments to a soft paste consistency, capable of being readily and uniformly dispersed to a homogeneous coating; good flow and brushing properties; capable of drying or curing free of streaks or sags.
- C. Accessory materials: Linseed oil, shellac, turpentine, paint thinners and other materials not specifically indicated but required to achieve the finishes specified; of commercial quality.
- D. Patching materials: Latex filler.
- E. Fastener head cover materials: Latex filler.
- F. Primers and topcoats: Type and brand listed herein or equivalent products as manufactured by Sherwin-Williams, Master Builders, or approved equal. All painting materials selected for coating systems for each type of surface shall be the product of a single manufacturer.
- G. Top coatings: Pigments shall be full ground maintaining a soft paste consistency, capable of readily and uniformly dispersed to a complete homogeneous mixture.
- H. Paints shall have good flowing and brushing properties and be capable of dry or curing free of streaks or sags.
- I. Compatibility: All paint materials and equipment shall be compatible in use; finish coats shall be compatible with prime coats; prime coats shall be compatible with the surface to be coated; all tools and equipment shall be compatible with the coating to be applied.

## 2.3 FINISHES

- A. Refer to other specification sections for finishes.

## **PART 3 EXECUTION**

### **3.1 INSPECTION**

- A. Finished surfaces will be inspected and approved by the Government representative. A wet-film gauge and microtest Paint Inspector, or similar gauge graduated in 2 mils increments shall be furnished by the contractor for the Government's use.
- B. Prior to all work of this section, carefully inspect the installed work of all other trades and verify that all such work is complete to the point where the work of this section may properly commence. Report in writing to Contracting Officer any condition that may potentially affect proper application. Do not commence until such defects have been corrected.
- C. Correct defects and deficiencies in surfaces which may adversely effect work of this section.
- D. Schedule all cleaning and painting so that dust and other contaminants from the cleaning process shall not fall on wet, newly painted surfaces. Where required, imperfections or holes in surfaces to be painted shall be repaired or filled prior to painting.

### **3.2 EXAMINATION**

- A. Verify that surfaces are ready to receive work as instructed by the product manufacturer.
- B. Examine surfaces scheduled to be finished prior to commencement of work. Report any condition that may potentially affect proper application.
- C. Test shop-applied primer for compatibility with subsequent cover materials.

### **3.3 PREPARATION**

- A. General conditions:
  - 1. Correct defects and clean surfaces which affect work of this section. Remove existing coatings that exhibit loose surface defects.
  - 2. Use shellac to seal marks which may bleed through surface finishes.
- B. Shop primed steel surfaces: Sand and scrape to remove loose primer and rust. Feather edges to make touch-up patches inconspicuous. Clean surfaces with solvent. Prime bare steel surfaces. Prime metal items including shop primed items.

### 3.4 APPLICATION

- A. Adequately protect other surfaces from paint and damage. Repair damage as a result of inadequate or unsuitable protection. Hardware, trim, and other items not requiring painting shall be protected or removed as required for proper application coatings. Such items shall be replaced after completion of painting.
- B. Furnish sufficient drop cloths, shield and protective equipment to prevent spray or droppings from fouling surfaces not being painted.
- C. Place cotton waste, cloths and material which may constitute a fire hazard in closed metal containers and remove daily from site.
- D. Apply paint only on clean, dry surfaces and when temperature of surface and of surrounding atmosphere is above 60°F. Coating shall not be done when surfaces may become damaged by rain, fog, mist, or condensation, or when it is anticipated that these conditions will prevail during the drying period, unless suitable enclosures to protect the surface are used.
- E. Apply products in accordance with manufacturer's instructions.
- F. Do not apply finishes to surfaces that are not dry.
- G. Apply each coat to uniform finish.
- H. Sand metal lightly between coats to achieve required finish.
- I. Vacuum clean surfaces free of loose particles. Use tack cloth just prior to applying next coat.
- J. Allow applied coat to dry before next coat is applied.

### 3.5 CLEANING

- A. Collect waste material which may constitute a fire hazard, place in closed metal containers and remove daily from site.
- B. As work proceeds and upon completion, promptly remove paint where spilled, splashed or splattered.
- C. During process of work, keep premises free from any unnecessary accumulation of tools, equipment, surplus materials and debris.
- D. Upon completion of work, leave premises neat and clean.
- E. Replace any damaged finishes including furnishings.

### 3.6 SCHEDULE - INTERIOR AND EXTERIOR SURFACES

- A. Steel – Primed; interior or exterior:
  - 1. Touch-up with Porter DTM semi-gloss acrylic primer, 3.0 mils DFT.
  - 2. Two coats of Porter DTM semi-gloss acrylic finish, 1.3 mils DFT, total of 5.6 mils DFT.

END OF SECTION

SECTION 13429  
ELECTRICAL SENSING AND MEASUREMENT

**PART 1 GENERAL****1.1 SUMMARY**

- A. Provide instrumentation including vibrating wire piezometers, junction box and surge protection, grounding, portable readout device, and the routing (including PVC conduit and pull-boxes) and termination of the instrumentation cables to the junction box.
- B. Related sections:
  - 1. Section 02020 – Piezometers
  - 2. Section 02324 - Trenching
  - 3. Section 16110 – Raceways

**1.2 CODES AND STANDARDS**

- A. American Standards for Testing and Materials (ASTM) Standards:
  - 1. B8-99 Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, and Soft.

**1.3 SUBMITTALS**

- A. List of piezometers with cable lengths. Identify method for marking and identifying cables from individual piezometers.
- B. Product data: submit catalog data and parts list for all piezometer components and cables. Include calibration sheets for the zero correction value, the gage factor, barometric pressure and temperature, and calibration data at the time of manufacture.
- C. Final as-built drawings showing the installed location, the instrument identification number, the instrument type, and the installation date and time. Include details of the installed instruments, including dimensions and materials used.
- D. Operation and maintenance manuals.
- E. Report of piezometer operational checkout.

**1.4 QUALIFICATIONS**

- A. Manufacturer: company specializing in manufacturing products specified in this section with minimum five years experience.

## **PART 2 PRODUCTS**

### **2.1 GENERAL**

#### **A. MANUFACTURERS**

1. Geokon
2. Geometrix
3. RSC
4. Approved equal.

- B. Provide all materials listed in this section from the same manufacturer. Where model numbers are given in this section, they shall be understood to represent models selected on the basis of past factory specifications and project experience demonstrating that the equipment, including stipulations herein, shall meet the specified performance objectives. Verify with the selected manufacturer that the designated model, or the updated version or approved equal, meets the design performance outlined by the drawings and specifications. The detailed working drawings and manufacturer's technical specifications submitted in accordance with the drawings and specifications for this contract shall comprise the criteria for equipment or materials approved.

### **2.2 PIEZOMETERS**

- A. Geokon Model 4500B vibrating wire pressure transducer piezometers; vibrating wire transducers measuring over a range of 0-XX kPa, an over-range rating of twice the rated pressure, plus or minus 0.2 percent full scale accuracy, 0.25 percent full scale resolution, capability to measure temperature, gas tube discharge electrical surge protection units incorporated inside the body. Provide specifications and project experience demonstrating that the equipment, including stipulations herein, shall meet the specified performance objectives. Verify with the selected manufacturer that the designated model, or the updated version or approved equal, meets the design performance outlined by the drawings and specifications. The detailed working drawings and manufacturer's technical specifications submitted in accordance with the drawings and specifications for this contract shall comprise the criteria for equipment or materials approved.
- B. Geokon Model 4999-12LE LAB-III surge protection board in NEMA 4 fiberglass enclosure for each piezometer.
- C. Geokon Model 8032-16-1 16X4-channel multiplexer in fiberglass enclosure with 16 Hubbell cable entries, surge protection, and 10-foot cable to MICRO-10.

- D. Geokon Model 8020-1-2 MICRO-10 data logger in stainless steel NEMA 4 enclosure with 120 VAC battery charger and 12V battery, power cable and RS-232 cable; includes CR10X controller and wiring panel, digital signal processing (DSP) interface, and COM 210 phone modem. Provide option for manual readout.
- E. Geokon Model 8020-7 solar panel, 20w with mounts, regulator, and 20-foot cable.
- F. Geokon Model 02-250V6 electrical cable, 4-conductor, 22 AWG; each conductor comprises 7X30 AWG stranded round wires of commercially tinned copper, 10-mil density polypropylene over each conductor, color coded, one pair red and black, one pair green and white; each pair of conductors under aluminum polyester shield; 24 AWG stranded tinned copper common drain wire; all conductors covered with a 0.065 inch thick jacket of blue pressure extruded vinyl: 0.250 inch plus or minus 0.010 inch nominal O.D.
- G. Geokon Model 8020-2 Multilogger operating software.
- H. Grounding rods: 3/4-inch diameter by 10-feet long, copper clad steel as manufactured by Copperweld, Blackburn, or approved equal.
- I. Ground cable: ASTM B8 copper, #4 AWG bare wire.
- J. Cable identification tags: Black Natvar 400 tubing with labels deeply embedded using Kingsley White Stamping Foil, Raychem thermofit marker, Alliance Industrial Products Company white plastic marker with black code marking, Marked Flexrite Shrinkdown HT-105 tubing, Actioncraft heat-shrinkable polyolefin marker, or approved equal.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Provide cables in conduit routed as indicated. Provide cables of sufficient length to route to terminal box without splicing. Attach cables to piezometers through an integral bulkhead seal, consisting of an interior waterstop seal and cable entry seal. Provide O-ring or hermetic seals tested and certified for water-tightness over the specified pressure range of the transducer.
- B. Install piezometers in accordance with the manufacturers requirements. Locate multiplexer, datalogger, and modem in the dam control room.
- C. Provide 3-phase surge protection circuit boards. The surge protection circuit boards shall contain a combination of gas tube discharge rectifiers, solid-state diode circuits, and coils to suppress electrical transients. Install surge



protection circuit boards on every lead wire connected into the terminal box to protect the vibrating wire piezometers.

- D. Install the solar panel in accordance with the manufacturer's requirements. Locate the solar panel on the dam embankment as indicated.

### 3.2 TESTING

- A. Coordinate with the Government representative for operational testing of the piezometers and software. Confirm proper piezometer data reception to Government computer at AEDC from the piezometer modem. Correct defects disclosed by the trial operation. Trial operations will be repeated and defects shall be corrected at no cost to the Government until the piezometers provide proper performance.

END OF SECTION

**PART 1 GENERAL****1.1 SUMMARY**

- A. This section applies to conduit, conduit fittings, conduit bodies, hangers, supports, and clamps required for a complete electrical raceway between boxes and devices as indicated on the drawings and specified herein.

**1.2 CODES AND STANDARDS**

- A. American Society for Testing and Material (ASTM) Standard:
  - 1. F512-01 Smooth Wall Poly Vinyl Chloride (PVC) Conduit and Fitting for Underground Installation.
- B. National Fire Protection Association (NFPA) Standard:
  - 1. 70-02 National Electrical Code (NEC).
- C. Underwriters Laboratories, Inc. (UL) Standards:
  - 1. 1-03 Flexible Metal Conduit.
  - 2. 6-03 Electrical Rigid Metal Conduit.
  - 3. 360-03 Liquid-Tight Flexible Steel Conduit.
  - 4. 514B-02 Fittings for Cable and Conduit.
  - 5. 797-00 Electrical Metallic Tubing.

**PART 2 PRODUCTS****2.1 MATERIALS**

- A. Rigid metal conduit: UL 6.
- B. Fittings for rigid metal conduit: UL 514B.
- C. Clamps, straps, and hangers: Malleable iron or steel, zinc or cadmium plated.
- D. Flexible metal conduit: UL 1.
- E. Fittings for flexible metal conduit: UL 514B.
- F. Conduit bodies: Aluminum with cover and gasket.
- G. Sealing compound: Silicone-based flexible sealant.
- H. Electrical metallic tubing (EMT): UL 797.

- I. Liquid-tight flexible metal conduit: UL 360.
- J. Underground hazard tape Panduit HTU6R-E or equal.
- K. PVC conduit and fittings ASTM F512.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

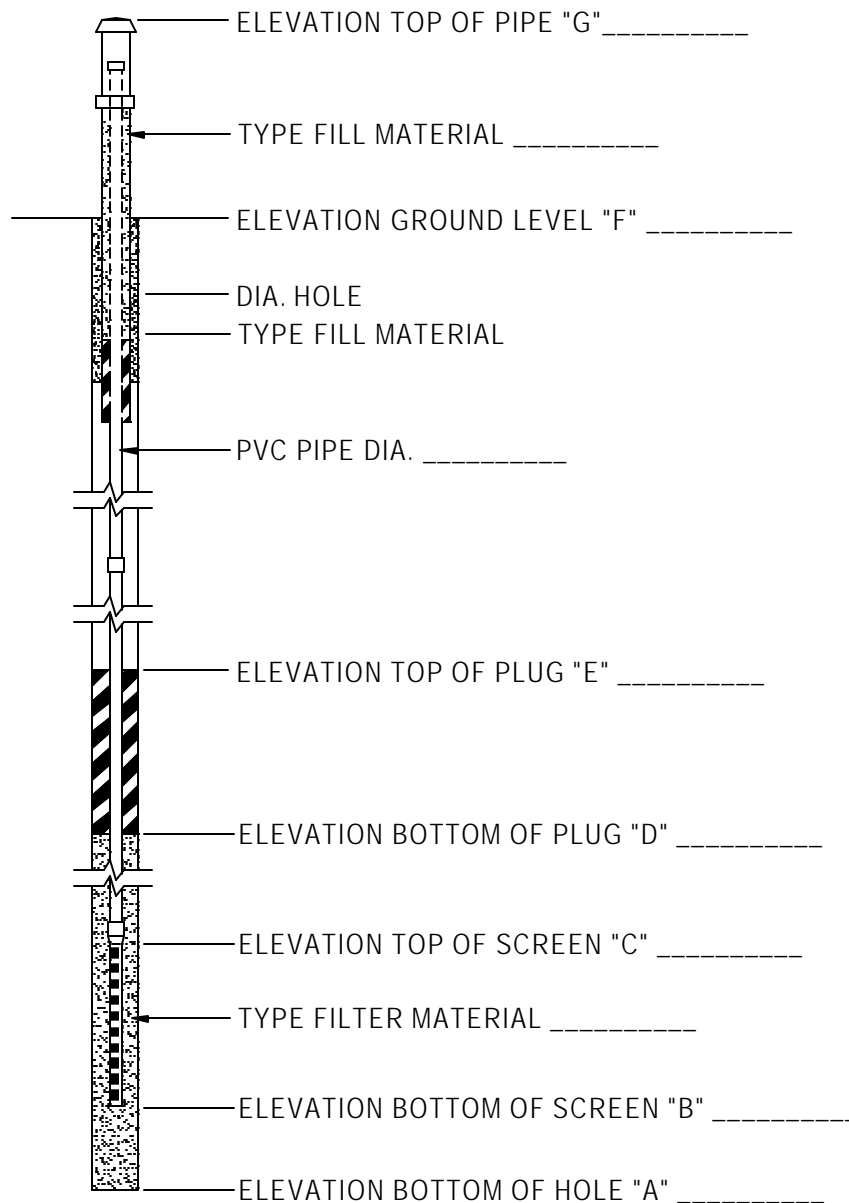
- A. Install exposed conduit parallel or perpendicular to walls, structural members, or intersections of vertical planes or ceilings.
- B. Install rigid conduit in accordance with the requirements of Article 346 of the NEC.
- C. Provide rigid conduit bushings in accordance with Article 346-8 of the NEC.
- D. Make rigid conduit bend radii in accordance with Table 346-10 of the NEC.
- E. Support rigid conduit with pipe straps, hangers, or clamps at intervals not exceeding those specified in Articles 346-2 and 348-12 of the NEC.
- F. Use stuff boxes and cork fittings to prevent entrance of water and debris during construction prior to completion of conduit installations.
- G. Provide gaskets for condulets and use compatible sealing compound with the conductor insulation to prevent water entry.
- H. Make conduit electrically and mechanically continuous in accordance with Articles 300-10 and 300-12 and ground it in accordance with Article 300-9 of the NEC.
- I. Install PVC conduit in accordance with Article 347 of the NEC.
- J. Install EMT in accordance with the requirements of Article 348 of the NEC.
- K. Install flexible metal conduit in accordance with Article 350 of the NEC. In wet locations, install liquid-tight flexible conduit in accordance with Article 351 of the NEC. Use a short section of flexible conduit at motor connections and components subject to vibration or periodic removal for maintenance.
- L. Do not weld support conduit brackets or other items to pressure piping of ducting, or structural members except as indicated or by specific approval of the Government representative.

- M. Cut conduit square using saw or pipecutter; debur cut ends.
- N. Provide EMT conduit couplings and connectors in accordance with Article 348-8 of the NEC.
- O. Support EMT conduit with pipe straps, hangers, or clamps at intervals not exceeding those specified in Article 348-12 of the NEC.
- P. Install conduit for instrumentation cables as shown and as specified herein. Use PVC below grade transitioning to RGS above grade using Teflon-coated RGS. Conduit exposed on dam structures shall be Teflon-coated RGS. EMT may be used indoors unless otherwise shown.

END OF SECTION

# PIEZOMETER DATA SHEET

JOB LOCATION \_\_\_\_\_ STARTED \_\_\_\_\_  
 COMPLETED \_\_\_\_\_  
 HOLE \_\_\_\_\_  
 DRILLER \_\_\_\_\_  
 INSPECTOR \_\_\_\_\_



TYPICAL PIEZOMETER (REF SHT C9)

SCALE: NONE